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Tutankhamen on his throne. From wall paintings on the interior walls of the tomb of Huy, who was Viceroy of Ethiopia in Tutankhamen's reign. The ruler is represented wearing the "blue crown of the King." In his right hand is the emblem of life. In his left hand he holds the shepherd's staff, symbol of leadership, and the scourge, which stands for kingly power. The serpent motif in the frieze is an emblem to ward evil influences. In December, 1922, representatives of the Carnarvon expedition opened the tomb of King Tutankhamen in the Valley of the Kings, near Luxor, Egypt, and discovered a wonderful collection, probably representing the most important period of Egyptian artistic development. Tutankhamen belonged to the close of the Eighteenth Dynasty, which ruled in Egypt from about 1600 B. C. to about 1850 B. C.

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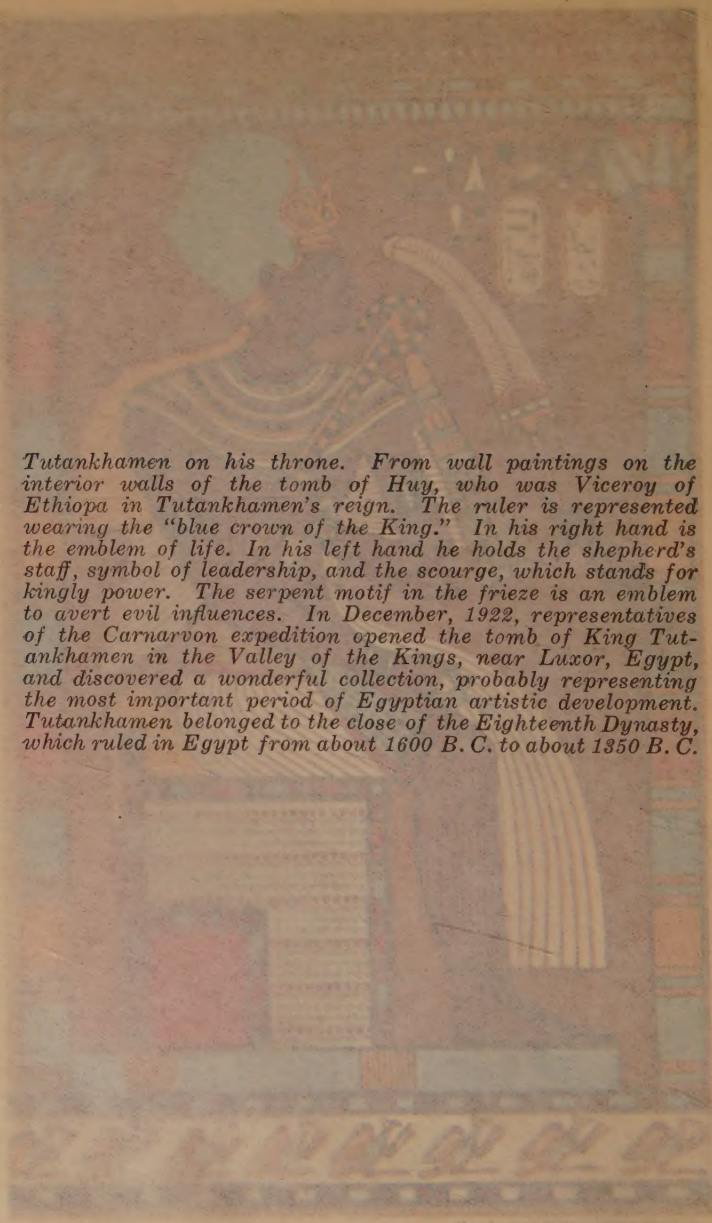

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THE MOST IMPORTANT DEVELOPMENTS IN SCIENCE,
ANNUALLY, FROM 1923 TO 1932

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VOLUME FIFTEEN

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ANTHROPOLOGY

The Science of Man and His Ancestors

BY

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P. F. COLLIER & SON COMPANY
NEW YORK

PREFACE

THE purpose of this volume is to present to the general reader a simplified story of the history of civilization. It does not pretend to advance any new or startling discoveries, or to deal with any controversial themes. The writer believes that every man and woman should know something of the development of the everyday things in their world in order to be able more intelligently to interpret the facts of life and of culture. Hence the attempt has been made here to tell something of the early existence of man on the earth at a period long before the dawn of history. As time slowly advanced through countless ages, he rose from the savage stage through the barbarian to the civilized. During this time his thought processes gradually developed so that he was able to fit his environment more perfectly. This process of adaptation led to the invention of tools and weapons of all kinds to aid him in the struggle for life; to the institution of marriage, to establish the home and carry on the race legitimately; to the development of religions, which helped him to understand the mysterious, unseen world; to the growth of sports and pleasures, which formed the necessary diversion in a life either dull or strenuous; and finally, to the establishment of government, which turned the unorganized mob into the orderly tribal and racial groups. The expansion of these various phases of activity brought about the civilization of to-day.

Hence the person who would comprehend the human world of to-day must know how our primitive ancestors strove to rise above their animal inheritance and to reach a stage where the life conditions were easier and where there was more leisure time for the growth and development of the arts and sciences.

In preparing this work I have received much assistance from Professor E. B. Tylor's book, "Anthropology." I also wish to express my gratitude to Professor A. G. Keller of Yale University for his advice and kindness in reading the manuscript.

LOOMIS HAVEMEYER.

Sheffield Scientific School
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New Haven, Connecticut
June, 1921.

CONTENTS

CHAPTER		PAGE
I.	FOUNDATIONS OF ANTHROPOLOGY AS A SCIENCE	9
II.	EVOLUTION AND ITS APPLICATION TO ANTHROPOLOGY	15
III.	PHYSICAL MAN	32
IV.	RELATION OF MAN TO OTHER ANIMALS	53
V.	THE ANTIQUITY OF MAN	69
VI.	THE CAVE MEN AND THEIR ART	88
VII.	THE INFLUENCE OF ENVIRONMENT ON CIVILIZATION	122
VIII.	THE MAKING OF LANGUAGE	140
IX.	THE DEVELOPMENT OF WRITING	164
X.	THE DEVELOPMENT OF NUMBER SYSTEMS	180
XI.	THE SATISFACTION OF HUNGER	185
XII.	THE DEVELOPMENT OF THE ARTS OF LIFE	205
XIII.	THE DEVELOPMENT OF THE ARTS OF LIFE—*Continued*	235
XIV.	MARRIAGE AND THE FAMILY	273
XV.	THE ARTISTIC FORMS OF PLEASURE	296
XVI.	RELIGION	326
XVII.	GOVERNMENT AND LAWS	360
XVIII.	SUMMARY	381

LIST OF ILLUSTRATIONS

TUTANKHAMEN, AN EGYPTIAN RULER OF THE 18TH DYNASTY . . . . . *Frontispiece*

FACING PAGE

EOLITHS AND PALEOLITHS 32
NEOLITHS 33
CHARLES DARWIN 64
PROTECTIVE COLORATION—SNIPE ON THE NEST . . . 65
PILTDOWN PLACE 80
KENT'S CAVE 81
JOHN DANIELS, "EDUCATED GORILLA" 96
PITHECANTHROPUS ERECTUS—RESTORATION BY MCGREGOR 96
VIEWS OF THE MAUER LOWER JAW 97
NORTH AMERICAN INDIAN 128
AFRICAN NEGRO 128
CHINESE MERCHANTS 129
POLYNESIAN 129
ROSETTA STONE 172
OBELISK BEFORE REMOVAL TO NEW YORK 173
MEXICAN INDIAN WOMAN GRINDING CORN IN PRIMITIVE FASHION 192
DECORATED MACE 193
ANCIENT MACE HEADS FROM EGYPT 193
BRONZE SCALES OF ANCIENT EGYPTIAN ARMOR . . . 193
STONEHENGE AT SUNRISE 272
INCA OBSERVATORY 273
GREEK STATUE 320
MAORI CHIEF AND HIS TOTEM POLE 321
ANCIENT FUNERAL RITE OBSERVED IN AMERICA . . . 352
TREASURES IN AN EGYPTIAN TOMB 353

CHAPTER I

FOUNDATIONS OF ANTHROPOLOGY AS A SCIENCE

A FEW years ago, when we were all children at school, we studied, among other things, a book on geography. This was illustrated with pictures of peoples from many lands. Those that aroused our especial interest were of the half-naked savages, for they seemed so different from any men that we had ever known. Around them we threw the glamour of romance and we dreamed that some day, when we were older, we would set sail to visit the South Sea Islands where they lived. When we studied about them we found, much to our amazement, that in many ways they were really not very different from ourselves. The children played their games of ball and shot their bows and arrows. In the evening before bedtime they would gather around the camp fire to listen to the tales of adventure as told by the old men and the warriors. Even the grown people lived and loved and died as those of a higher civilization do under similar conditions.

As we passed from childhood to youth, and from youth to manhood, these thoughts of our early years were driven away by the sterner things of life. Our time and energies were devoted to making a living, so that romance and dreams fell entirely into the discard. If our thoughts ever traveled back over the years to that old geography

in the little schoolhouse, it was when some missionary begged for money to redeem the poor heathen savages from their life of sin. Possibly we have put our hands into our pockets and given something, more as a memorial to our childish dreams than from any real interest now. If we were to search down into our heart of hearts, we would find there a sneaking feeling that these primitive peoples were playing at life rather than really living it. We possibly regard their existence as one long vacation and think that they go through the years without any cares or worries. We can no more take their efforts seriously than we can the play of our children. If we read very much we have probably enjoyed numerous books of travel, where the author takes us on a hurried trip through the South Seas or into the heart of Africa. Many of these volumes are written to amuse rather than to instruct, and so the impression in regard to the savage peoples which we have always held is merely strengthened.

Strange as it may seem, it is upon these children of the human race, whom we loved in our youth but ignored in later years, that the science of anthropology is based. Now that is a very long word, and as some one has said about a similar one: "It's a good word if it has a tremendous lot packed up in it. If it hasn't, it's much too long." Before we can find out how much there is packed up in it, we must discover what it means.

The word anthropology, which is of Greek origin, comes from two words, "anthropos" meaning "man," and "logos" meaning "a discourse" on, hence together they mean "a discourse on man." The science can, therefore, be defined as that one

which has man for its subject. "Of the various branches of knowledge whose subject is man, the most comprehensive is anthropology, which in fact, taken in its broadest sense, embraces all the others." It studies man as an animal and shows his physical relationship with the other members of the animal world, and also the differences existing between the various races on the earth. It deals with the distribution of the peoples throughout the world and it tries to explain how and why they settled in the places where we find them to-day. It takes up the development of the civilization of all these peoples and traces their culture from the beginning down to modern times. As this was the result of human thought, we can also include in the science of anthropology the study of the mind of man as it expanded along social lines.

With such an enormous topic in front of us it is necessary to limit ourselves to only a few of the more important facts in connection with man and his activities. It is for this reason that we might call this volume "Beginnings," for we are going to take up merely the early forms of those things which have gone into the making of our modern civilization. But before we can do even this we must look at some of the laws which from the earliest times have governed the animal and plant world, for only by so doing can we show that man is related to the rest of the plant and animal life on the earth. Through slow stages of development he has gone on until he has reached a point where many of the laws which govern the rest of life cease to apply to him.

One topic that we are to deal with is the length of time that man has been on this earth. We are

all living in an age where the motto seems to be "Hurry." If we want to go from one place to another we do not ask how far it is, but how long will it take to reach there. If there is a piece of work to be done, we want to know, not how well it can be accomplished, but how quickly. Applying this modern speed idea, we want to find out how long it took man to reach the twentieth century.

If one has kept his old geography, let him take it out and open it to the map showing where live all the peoples on the earth. He will notice that there are some uninhabited lands, and there are other places where the population is very dense. There are very few of us who have stopped to reason out how it happened that people came to be scattered over so much of the earth and in so many different places. If one accepts the story of Adam and Eve, or if one believes that all the races of man came from one race, there still remains to be explained how they came to be as widely separated by land and sea as we find them to-day.

We have in America, and in all the great modern countries of the world, a civilization of which we are justly proud. There are huge cities connected by miles of railroad, by telephones and telegraphs, and in these centers are thousands and hundreds of thousands of people all working and living and playing together. There are churches and art galleries, theaters and moving-picture houses, great factories and stores in which wares are displayed from all over the world. We are governed by laws and customs, we read books and newspapers, we dance and sing, we marry and are given in marriage. All this is called civilization.

One of the first lessons that we must learn in anthropology is that all of the institutions which we have just mentioned did not arise as we know them to-day. They came to us through long years of development, and as a small seed planted in the ground will ultimately grow into a big plant with flowers and fruit, so did these things which go to make up our civilization grow from very simple beginnings. One of our tasks here is to search throughout the world for these seeds of our modern culture, and when we have found them, possibly among the most primitive of the savages, to trace their growth and development down through the ages to our own time. The more we come to know of the early peoples the more do we realize how important it is to study their life conditions in order to have any correct knowledge as to how our civilization came to reach the height at which we now find it.

This idea is the foundation upon which much of the science of anthropology is based, and, therefore, the reader will have to get it very clearly in mind before we can go on with the main part of the story. Nearly everything which we enjoy in life can be traced back to a very simple form among different savage peoples the world over. Our great transportation system finds its origin in the log floating down the stream upon which the half-drowned savage climbed in order to save his life. We can see the beginning of the art of cooking when the early hunter threw the freshly killed animal in the embers of the fire. There are, of course, many intermediate steps between his crude method and the highly developed art which we find in every modern kitchen. The primitive man considered himself very lucky if

he could discover a cave in which he could find protection from the weather, and from the wild animals; we build big houses in which there are comforts unthought of even a few years ago. And if we look at the less material things we find that the same development has taken place. Our complicated religious systems will find their beginnings in the appeal of the savage to his spirits to protect him from the numberless dangers with which he considered himself surrounded. Even our laws can be traced back to a big brawny savage chief who wielded the big stick and by it insisted that his will be obeyed by all of the members of his tribe. It was a slow and painful development, with numerous trials and failures to be undergone, from the time when these simple methods of living were practiced to the modern day when our life is so complicated. We are able, with the help of the anthropologist, to trace each step in the development of many customs and practices, and we soon come to the realization that every new step is the logical outgrowth of its predecessor. What we are going to try to do in this book is to show how many of our institutions developed, bit by bit, from the simple forms that we find among the savages.

CHAPTER II

EVOLUTION AND ITS APPLICATION TO ANTHROPOLOGY

ANTHROPOLOGY has already been defined as the science of man. It treats of him physically and mentally, it compares him with the lower animals, and shows in what respects he is the same and how he differs. He is dealt with in his relations to other men, and the development of his whole civilization from the beginning down to the present time is traced.

Before we can advance very far with the subject, we want to discuss man's place in the animal world and to look at a few of the laws that have caused him to reach his present position at the top. In order to do this it will be necessary to summarize briefly the main theory of evolution, since on this depends the science of anthropology.

There died some years ago in England a man by the name of Charles Darwin. He was a scientist who spent most of his life in studying plants and animals with the hope that he might find some general laws that governed all the living world. In this he was successful, and while many of his conclusions have been overthrown by recent science, yet his fundamental ideas still stand as a monument to his untiring efforts, unaffected by the most recent efforts of scientific investigators.

The basic idea of evolution is that all life started from a single cell. It is unimportant for our purpose to argue how this one cell came into being, as scientists have in no sense agreed on this point. However it may have been, we know that this one cell divided into two cells and the two cells into four cells and so on up until the complicated many-celled organisms were reached. Through millions of years this process has gone on, but the relationship between all living things on the earth—from the simplest plant to man—has remained and is uniform enough to be described under a general law which is called evolution. If this statement is true, then how does it come about that there is such a great divergence among all living things? To answer this question in detail would require very much more space than we can devote to it. We can briefly make clear, however, the main laws governing these changes.

If the reader will look around him at the plants and animals of his environment, he will realize at once how well suited they are for the place in which they live. We call this suitability, adaptation to environment; to put it in other words, it means ability to live. Everything from the smallest blade of grass to the great oak, and from the little fish to the huge elephant, seems to be fitted with those qualities that enable it to survive successfully. There are certain forms of this adaptation that, on the surface, are more striking than others. If a plant or animal is able to live, it must have some means of defending itself against the numerous enemies that surround it on all sides. Some of these means of protection are active, as the strength of the lion, while others are passive, as the ability to hide successfully. In

this latter class we find such things as protective coloration. If a person goes into the woods in the autumn, and if his eyes are keen, he may see there birds and rabbits whose feathers and fur are so nearly the color of the brown leaves that they are detected with difficulty. Let him go when the snow

FIG. 1.—PROTECTIVE COLORATION—BRAZILIAN BUTTERFLY THAT LOOKS LIKE A DRY LEAF WHEN RESTING

is on the ground, and he will see that the brown coat has, in many cases, been changed to one of white, so that it blends into the landscape.

In order to prove how important a means of defense this protective coloration is, an Italian scientist fastened twenty green bugs among green herbage and twenty brown bugs of the same kind among brown herbage. After seventeen days they were all alive. He then reversed the order, and

tethered the brown bugs in the green environment and the green bugs in the brown grass. Seventeen days later thirty-five out of the forty had been devoured.

If the rabbits should keep their brown coats in winter they would be an easy prey, against the white snow, for their enemies. There is apparently a contradiction to this state of affairs in the brilliantly colored insects that stand out in striking contrast to their surroundings. It would seem as though the birds could see them at a distance and swoop down upon them. The interesting fact is, however, that some of them are either poisonous or very distasteful to the birds, and so their bright coloring protects them by acting as a danger signal to all who would seek a meal there. The birds will no more go near them than a human being will approach a red flag hung in the neighborhood of blasting. Thus even these apparent exceptions to the rule benefit by protective coloration.

Ordinarily those animals that have this passive means of protection have little physical strength with which to combat their attackers. They may, however, have great speed, or, lacking this, a hard shell, like the turtle's, into which they can withdraw in time of danger. The lion, the tiger, and the elephant have great physical strength; even the placid swan has enough power in its wing to break a man's leg. Snakes have poison and the skunk possesses a most effective weapon for driving off its tormentors.

In the plant world the same wonderful adaptation to environment is constantly appearing. Those living in the dry regions sustain life by developing long roots that penetrate deep into the ground in

search of any moisture. The cactus grows thick leaves in order to prevent evaporation of whatever moisture it may contain, and the sharp spines prevent any animal from feeding on it.

We could go on giving hundreds of illustrations to show this perfect adaptation; in fact, it would be easy to demonstrate how every living thing, with the possible exception of man, is physically suited to the environment in which it is living. It is wonderful to think that all of these forms of life are related, and that they all came originally from a few species, indeed, from a few cells. Before taking up any further discussion it is necessary for us to look briefly at some of the laws which brought about this wide divergence of species.

In walking through the woods or fields in the spring even the casual observer will notice how rapidly the trees and plants are trying to reproduce themselves. They are all filled with seeds, and each one of these is a potential plant. Let us suppose that a tree produced fifty seeds a year (and there is none that produces as small a number as this), and if each one of these produced a like number that lived, in the ninth year of production there would be 1,950,000,000,000,000 seeds. If each grew to maturity and occupied one square foot of ground, the whole surface of the earth would be covered and there would be no room for 500,000,000,000,000 seeds left over. But fifty seeds a year is a small number, compared to the acorns on a single oak, or the number of kernels in an acre of corn.

The same rapid increase tends to take place in the animal world. If an animal produces ten pair a year, all of which live, and this ratio continues for twenty years, there will be 700,000,000,000,000,000,-

000,000 pairs alive. But as compared to the roe of a fish ten pair is as nothing. For instance, the female salmon in the Columbia River goes upstream at the age of four years, lays four thousand eggs and dies. Half of the eggs develop into females. If each female came to maturity, at the end of fifty years there would be eight (42 zeros) female salmon and as many males, as the offspring of a single pair. If all lived, they would fill the waters of the rivers and oceans.

The elephant is considered the slowest breeder of all animals. It begins breeding when thirty years old and goes on breeding until it is ninety, bringing forth about six young during this interval. If each lived to the age of 100, after a period of 750 years there would be 19,000,000 elephants from the first pair.

There are actual cases where this state of affairs really exists. Some years ago rabbits were introduced into Australia, where they found a very favorable environment and few enemies. Since there was nothing to prevent their increase they have become a regular pest. These animals begin breeding at six months, produce six litters a year and five at a litter. The original pair in five years might be responsible for 20,000,000 rabbits. These rodents destroy each year so many crops that it has been necessary to erect thousands of square miles of rabbit-proof fencing, and big farmers employ men who do nothing else but kill these animals. The yearly cost to Australia is about £700,000 and so serious has the problem become that the Government has offered a prize of £25,000 to anyone who can devise some means of ridding the country of this pest.

It was only a very few years ago that the English sparrow was unknown in the United States. Some one brought it over here, and, as it found a place that was to its liking, with very few enemies, it increased so rapidly that bounties are being offered for every bird killed.

It is perfectly obvious that this condition of affairs does not exist in general throughout the world. The increase in the number of plants and animals in any year is slight—we find no one species dominating the entire country or even any appreciable growth in numbers occurring. This means that of those seeds or young animals brought into the world only a very small proportion survive. Each one is forever struggling for existence with the environment or with enemies, and only the strongest survive. Of all the acorns on an oak probably only one really becomes a tree, and there are billions of fish eggs that are destroyed before they are hatched. Darwin made an interesting experiment to prove this point. He took a piece of ground 3 feet long and 2 feet wide and dug it up so that there would be no choking from other plants. Then he marked all the seedlings of the native weeds as they came up. Of the 357 that appeared 295 were destroyed by slugs and insects.

Every thing in the world has its enemy. It may be others of the same species or of a different species; a dry season may kill off many seeds of one kind, while a wet season will do the same for others. Too much heat or cold is always fatal to many living things, and if they are able to survive climatic changes, some foe may come along and devour them. When one realizes the dangers that surround plants and animals on all sides from the

first day they appear on the earth, it is wonderful that as many live as do. This struggle for existence is one of the fundamental laws of nature.

The world of nature is a complicated place. All things are dependent upon other things for life. Man feeds on the animals that in turn feed on grass. Disease germs fasten themselves on man and carry him to his grave. Some twenty-five years ago there appeared on the lemon trees of California a cottony cushion scale which began to destroy them. Various methods were tried to eradicate the trouble, but without success. It was later found that in Australia the scales were kept down by the ladybirds, and so some of them were brought over to this country. The experiment was a success, and the scales were nearly eliminated, but with their disappearance the birds died from lack of food, and then the scales began to increase again.

The question that has probably presented itself to the mind of the reader is this: what determines which of the seeds shall live and which die? It can be answered by a brief discussion of the next law of evolution.

No two individuals in the plant and animal world are the same. Every one differs in some slight degree from every other one. It is this slight difference that may enable one to live while the others die. If we were to take a pile of acorns or a bushel of corn, there would be such a general similarity between all of the units that we should know to a certainty that if one of the acorns or one of the kernels was planted and it grew, the result would be an oak or a stalk of corn. This quality that tends to keep the general type the same we call heredity. That is, the apple tree will always bear apples, and

the grapevine grapes, the offspring of a cat will always be a cat and of the same type. One does not find winesap apples growing on a Baldwin tree, nor horses giving birth to dogs. But what we do find is that each winesap apple on that type of tree will differ from all the others, and every pup in a litter will vary considerably from his brothers and sisters. Now it is just this variation, no matter how slight, that enables some to live while others die.

It will be well to illustrate this point, for it is a very vital one. If one seed has a little thicker shell than all the others on the tree, when a very heavy cold snap comes along this one may survive while the others succumb. A young polar bear with a somewhat heavier coat than his brothers may withstand the cold better, but he has not quite as long and sharp claws as those in another litter and so he is killed in a fight. A quality that may enable a seed to live one season may be just the thing that will cause it to succumb the next. One plant in a tropical forest can climb into the sunlight, while another one is able to go only a short distance, so that it dies, while the other lives. Most of these variations are so slight that man cannot see them even with a microscope, but nature, with her keener sight, is able to find those qualities that are best suited for the environment and these she preserves, but the individuals who do not possess them are allowed to die or be killed. This process is known as natural selection or survival of the fittest.

There is another process of nature which in general resembles variation. It is called mutation. As we have seen, a variation is a very slight difference in the offspring. A mutation is a much greater difference. For instance, if a human child were born

with six fingers on each hand, or a white rose appeared on a red rose bush, it would be called a mutation. Mutations are not common, but they do occur. If the difference is of such a character that the individual possessing it is unfitted for life, he will die, but we find that natural selection works here as well as in the case of variations. The cause for these mutations is, up to the present time, unknown.

It has been proved that, if two individuals possessing a mutation are bred together, the majority of the offspring will also have this quality. If this process is kept up for several generations, all of the offspring will have the mutation. Possibly by this means new species arise. Darwin claimed, however, that most of the new forms came through the slower process of variation with natural selection. How, according to his theory, this came about we will now discuss.

We have seen that any plant or animal born with qualities that enable it to fit into its environment successfully, lives, while those possessing any weakness, no matter how slight, die. To put this in other words, strength survives and weakness is ended by death. With life comes the ability to pass on this strength, by heredity, to the generations that are coming, thus making them more fit to exist. Let us now suppose that the environment alters. This may occur through great climatic changes, or by the animals and plants being carried or migrating from one portion of the world to another. This necessarily brings up totally new conditions, and means that those living things not able to adapt themselves will die. The qualities that enable them to live must be the strong ones, and hence the next generation will tend to be born with these attributes.

That is, if some seeds have thicker shells than others and the rainfall increases, the added thickness may enable them to withstand the moisture, while those with thinner shells will decay. The next crop of seeds will tend to have thicker shells, but here, too, the thinner ones will die off. The result will ultimately be that a new quality, namely much thicker shells, will appear in this particular kind of seed. Let a condition such as this gradually changing environment continue for hundreds of thousands, or possibly millions, of years and we have one of the ways whereby new species arise. Add to this gradual development the fact that mutations are appearing from time to time, and we have the reason for so many different species on the earth to-day.

We cannot leave man out of the great scheme of evolution, for in the last analysis he is an animal. As a physical being he has risen from the lower forms of life, climbing, as it were, the ladder of development until he has come out on top. But since he became man he has made relatively few physical adaptations to his environment, for he was given a superior brain and through the workings of this organ he has been able to overcome many otherwise insurmountable obstacles. He is continually struggling with the animals and plants of his environment and in most cases he has been the victor. But this conquest is not by any means finished, for the animals and plants that cause disease are frequently showing him that he is not master as yet. When great epidemics sweep over the world carrying off millions of people, man realizes for the moment that he has met a stubborn foe. But the brain of man is forever working to seek out the form and the hiding places of the germs—those minute particles

of life which cause the epidemics—and having isolated them, he tries to find means of destroying them. The time may come when man can claim that he is the supreme master of his environment.

The laws of evolution (heredity, adaptation to environment, struggle for existence, etc.) which we have been applying to plants and animals do not terminate entirely when we reach the human species, although many of them, because of the vast artificial environment with which man has surrounded himself, do not act to the same extent as they do with the rest of the living things. While all the other things have been adapting themselves physically to their environment, man has been doing the same thing mentally. Instead of growing a coat of fur to keep himself warm, he learns to kill the bear and make a covering out of his skin. He does not develop wings to fly, but invents an aeroplane to carry him like a bird. In the cold climate he builds houses which he can heat to keep him warm. If he wishes to get over the ground rapidly he does not develop his legs, but discovers an automobile. When it is necessary to kill, he invents weapons instead of growing claws and sharp teeth. All such inventions limit the action of these natural laws.

As civilization advances the population increases so that we find on the earliest stage of civilization it will take many square miles of territory to support one man, while in regions of the world where there is great manufacturing, there are more than 750 to the square mile. Man has been constantly learning new methods of getting a livelihood from the time that he killed his first animal with a stone, down to the present time when animals are bred by the millions for food. Almost within our own

lifetime we can see the increase due to better methods of living. The population of Europe doubled between 1800 and 1887 (rising from 175,000,000 to 350,000,000), and to-day it would not take more than twenty-five years to accomplish the same result.

The struggle for existence is still going on, but it is not as severe as in nature. There, where a plant or animal is not able to fit into the environment it dies, but man is willing to support the human failures, and so he puts up hospitals for the physically imperfect, and jails, insane asylums, and poorhouses for the mentally or socially incapacitated. If a child is born with some defect so that it will never be able to look after itself, we tend it carefully and allow it to live, but in nature it would die almost at once, for there we find no imperfections. The obvious result of all this is, that we have what some people assert is the survival of the unfit instead of the fit. What the future has in store for the race we do not know, but to anyone who has looked at the figures, the increasing number of insane and otherwise defective persons is appalling.

The law of heredity acts with man as it does with other living things. Children are always of the same general type as their parents, but no two children are exactly the same. Even so-called "identical twins" have different physical and mental qualities that can be recognized by those who know them well.

As we have seen, it is these differences in plants and lower animals that determine whether they are fit to live or not. But in man, with his artificial environment of civilization, they are unimportant as far as the matter of actual existence is concerned.

To have the strict application of these laws to man would take millions of years and even then it is doubtful whether they could act to the same extent and in the same way as they do with other things. Were the experiment to be tried, we would take away everything from man such as tools, weapons, houses, clothes, and put him out in the world to live, possessed of nothing but his own body. The majority of people would die within a few days, especially in the colder climates of the world. Nature would immediately begin to act, and finding them unfit for their environment in every way would eliminate them. The rest would begin to adapt themselves, but again it would be mental and not physical adaptation. They would search for roots, berries, and nuts for food; they would find a cave or a hollow tree until they could devise some means of killing an animal and using the skin for clothing. And thus the process of civilization would start all over again. Taking man as he is to-day, it is impossible to conceive of a condition, provided he has any chance at all, where some few would not be able to live by mental adaptation. Of course if he were to be put into the arctic regions with nothing, he would freeze to death before he had an opportunity to do anything. But let him be placed in the warmer regions of the world, enough would survive so that the race would not be entirely wiped out.

The whole study of anthropology shows man's attempts to adapt himself to his environment. He is ever striving for the unattainable goal of perfection. Everything that we call civilization to-day has been brought about by man driven by the desire to make living easier and better. But he is never satisfied. He always wants more than he has,

and as soon as he has reached one goal he is looking ahead to something else beyond. If the human race ever reaches what it considers perfection, all motive for civilization will cease. There will be no joy in living, as striving for the unattainable is the motive power that keeps the wheels of society moving. If a man could play a perfect game of golf every time, putting the ball into the hole in one stroke (if the distance was not beyond human power), he would turn to some other game which enabled him to strive for perfection rather than reach it.

Many of these same laws of evolution apply to the social world as well as to the physical. All of our social institutions are forever moving from the simple to the complex. As life starts from the single cell, so does the development of the house, for instance, start with the few branches placed against the side of a cliff to form a shelter. The cell divides and adds to itself other cells until we have a complex organism. The house develops from this first simple form down to the modern palace. Each stage, in both cases, is the logical outcome of that which has gone before. Something corresponding closely to the struggle for existence is likewise going on among the inanimate objects and among the institutions of civilization. The stone ax survives in the competition with the one made of shell, and it, in turn, succumbs to the one of steel. Each old form of the plow is given up when a better one appears. The cave is abandoned for the hut and the hut for the house. The cruder and more superstitious forms of religion give way before the more enlightened modern doctrines. And so things move along the line of evolution throughout the entire social world.

This all means that instead of natural selection we have social selection; that the less fit form gives place to the more fit. Man is forever making the choice, taking those things which he considers the better, and discarding the others. There are, of course, many trials and failures, for evolution does not always mean steady upward progress. Many of the things tried may prove to be worse than those already in use and so will have to be discarded after they have demonstrated their unfitness. But taking a long period of time as the basis, we find that civilization has ever been tending upward. Great events such as the World War started in 1914 throw advancing culture back for a time, but five hundred years from now it will be seen that this check was only temporary.

Heredity also plays its part as a law in social evolution—not physically, but mentally. We mean by this that customs, arts, religions, sciences are passed on from one generation to another by word of mouth, and by imitation. The father teaches the son, who in turn instructs his offspring as to how various things are done. If he has improved upon the old method he demonstrates this in his teaching. If he has tried some things and failed, he describes these failures so that the same mistakes will not be repeated. "Ever striving for the best" is the motto that has driven man on from the beginning. If it were not for the fact that it is possible to pass this learning on, each generation would be devoting its entire time to discovering and taking over again the first fundamental steps. As physical man is the sum of all the evolutionary changes that have taken place since life first appeared on the earth in its lowest form, so is the

civilization which we know to-day the sum of all the trials and failures of every man and every race since the time when man became man.

Lastly we find that as environments vary, so do the types of culture change. As peoples moved from the tropics into the cooler regions of the world, they necessarily adapted their civilization to the new conditions. Scant body coverings gave place to heavy clothes and hunting gave way to cattle raising. When they began to till the fields they ceased to worship the gods of the animals and turned to the sun and the rain as the sources of their help. In time these changes brought about an entirely new form of culture.

When we come to a more detailed study of the development of those things which go to make up the civilization of the world, the reader will realize how important it is to have this whole evolutionary idea firmly fixed in mind, for without it anthropology cannot be classed as a science.

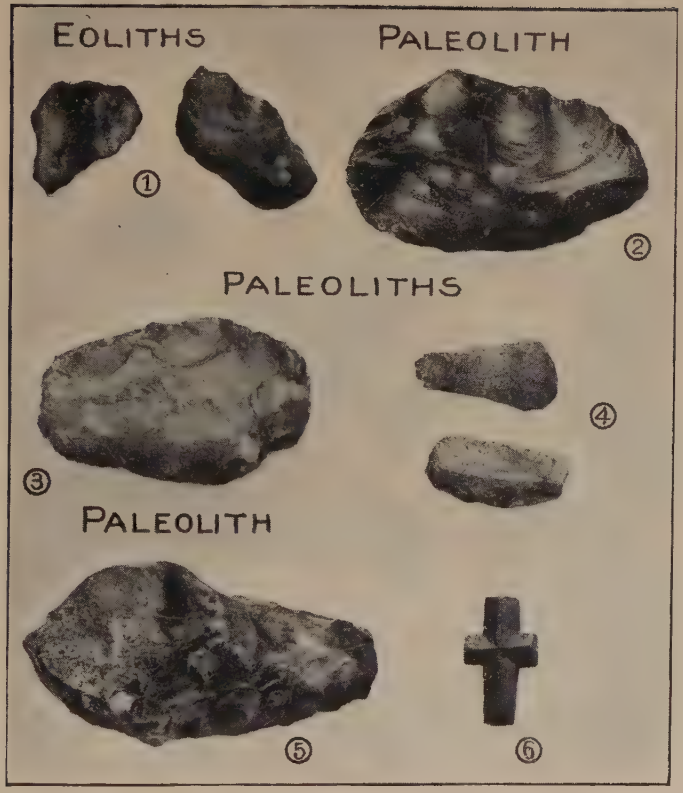
CHAPTER III

PHYSICAL MAN

THERE are to-day scattered throughout the world five main races; the black, the brown, the red, the yellow, and the white. When an even simpler classification is wanted we speak of the black, the yellow, and the white, for under the yellow we include the related races of the brown and the red. We have named these by their color, for that seems to be the most obvious feature to the casual observer, but we could have used numerous other bodily characteristics that distinguish the races from each other.

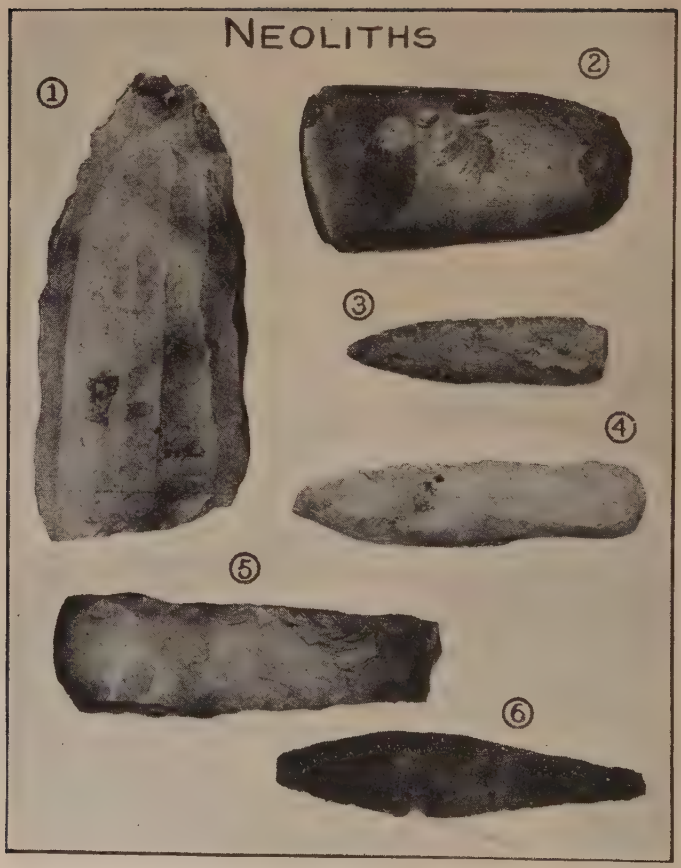
As we have said before, mankind belongs to one species. This is demonstrated by the great similarity in bodily structure among all peoples, and by the fact that all the races are mutually interfertile, that is, any racial combination can bring forth children.

In dividing man into groups we find ourselves dealing with a much more difficult problem than that of classifying animals. Man has wandered far over the world and the races have become intermingled; to say that at this spot one race begins and another one ends is almost impossible. Were we to line up the 1,600,000,000 inhabitants of the world according to the shades of color, going from the lightest albino at one end to the blackest negro at the other, we would find that the greatest numbers would gather around certain definite points. These points



EOLITHS AND PALEOLITHS

(1) Two so-called eoliths from Parsonage Farm, Chalk Plateau, Kent, England. (2) Chellean implement from a gravel bed at Farnham, Surrey, England. (3) Acheulean implement from base of ancient loess, St. Acheul, France. (4) Two Mousterian side scrapers from La Quina, Charente, France. (5) Chellean implement from gravels of the next to youngest terrace at St. Acheul, France. (6) The Southern Cross, a natural formation.



NEOLITHS

(1) Neolithic nucleus, Spiennes, Belgium. (2) Neolithic, thin-poled ax, Scandinavia. (3) Neolithic poniard, Jutland. (4) Neolithic pick, Spiennes, Belgium. (5) Neolithic thin-poled ax, Jutland. (6) Neolithic poniard, Denmark.

would be five in number and would represent the typical race character of each of the dominant races. Between these points there would be fewer people and they would represent the mixed races. An illustration will make this clear.

The first man whom we take is, we will say, obviously a typical white man and therefore he goes down on the chart as number 1. Number 2 is also

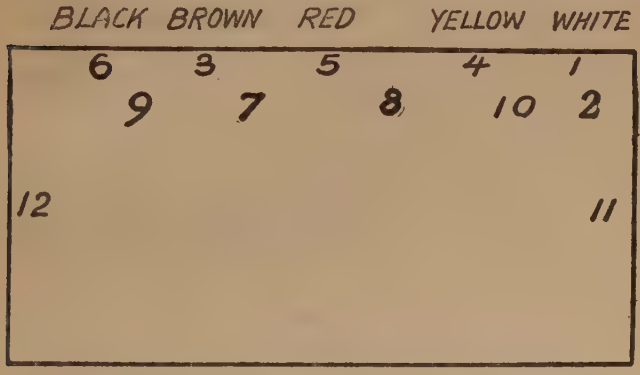


FIG. 2.—CHART ILLUSTRATING RACIAL COLOR

white, number 3 is brown, number 4 is yellow, 5 is red, 6 is black. When we come to 7 we see that he comes between the red and the brown, number 8 between the yellow and the red, 9 between the black and the brown, and number 10 belongs to the dark white group. Number 11 is the albino and number 12 the very black negro. Continuing this process until every person in the world has been classified according to color it would be found that the greatest number would group themselves around the main races, whereas there would be a falling off between them, that is, at the spots we have designated as 9, 7, 8, 10. Were we to connect by curved lines

the high and the low spots we would have a figure resembling the one below.

The words "Race Type" are constantly being used by people, but usually without the knowledge of their exact meaning. The race type has the average char-

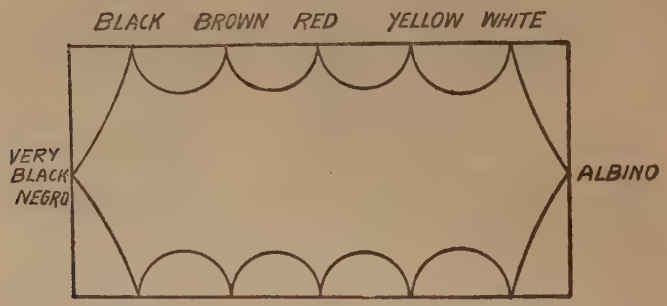


FIG. 3.—DIAGRAM RESULTING FROM CHART

acteristics of all the members of the race. It is obvious that no one individual will be found possessing all of these, but there will be some that have more than others. This race type is like a composite photograph of all the members of the race.

It frequently happens that we desire to find the race type of some savage tribe, and so the method of obtaining it is a practical problem. Each individual of the tribe would be measured carefully for height, weight, shape of skull, eyes, nose, cross section of the hair, etc. These figures would be set down and then the average of each measurement taken. For instance, as regards height, there would be some few at five feet and some at five feet eight inches, but the majority would be five feet four inches. Hence this latter figure would be typical of the race, as far as height is concerned. This process could be plotted out as we did that of color, except

that we confine ourselves to one race instead of all of them. The result could be illustrated by a diagram, as in Figure 4.

If, after getting the average of all the characteristics, we were to model a figure that had them all, the result would be one that could be called the "Race Type."

This process could be carried on easily with all the races except the white. They have so intermarried with other peoples that there are no definite characteristics that stand out. It is not difficult to describe in general a more or less typical negro, but to do the same thing with the white race is a hard task. For instance, all the negroes have black hair, but in the white race the color ranges from very light to very dark. The nose of the negro is in varying degrees of flatness, while in the white race noses

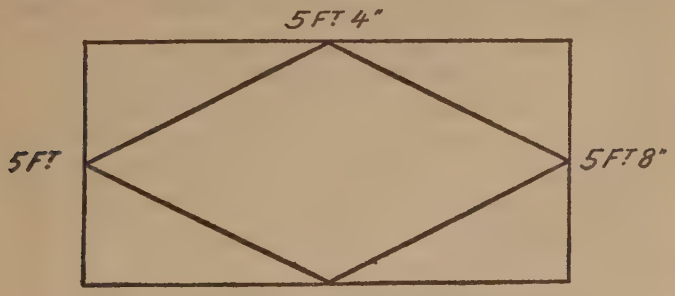


FIG. 4.—DIAGRAM TO ILLUSTRATE RACE TYPE

are found of every possible shape. This would hold true for practically every physical feature.

The question is immediately brought up as to why the other races are easier to classify than the white. The answer is not hard to find. It is because nearly all the lower peoples have, to a great degree, been isolated from other groups while the whites have

wandered over the whole world. In order to get a relatively pure race of anything it is necessary to be able to prevent crossing. The animal breeder who is after certain types makes very sure that no other strain comes in. It is obvious that with man there has been some isolation, otherwise all the races would be the same. If one has a glass of ink and a glass of water, as they stand they are relatively pure, but if they are both poured into a pitcher and then turned out again into the glasses, the same product will appear in both.

In classifying man, if we were dealing only with the bodily characteristics, our problem would not be much more difficult than if we were dealing with animals. The mind of man, however, baffles most classifications. As we have already seen, animals adapt themselves physically to their environments while man does so mentally. The success or failure of this adaptation is shown by the types of civilization of the different races. Therefore, what we are trying to do in this book is to classify man on the basis of his mental adaptations to his environment. Before doing that, however, we must briefly look at his physical characteristics and see something of the methods whereby we group men on this basis.

As we have said, the color of the skin is the most obvious of all the physical characteristics. This varies all the way from the light skin of the albino to the very dark negro. Although the term black is used to distinguish the skin of the negro, in reality there is no absolutely black skin, but only varying shades of brown. It seems to be the rule that the nearer we get to the equator the darker the skin becomes. The apparent exceptions to this rule are

probably brought about by races migrating from the colder regions into the south and vice versa, and also by a certain amount of race intermixture.

On the basis of color the main races divide in the following manner:

Black—African and Oceanic Negroes, Australians, Tasmanians, some aborigines (original inhabitants) of India.
Yellow—Mongols, Indo-Chinese, Japanese, Tibetans.
Brown—Malays, Polynesians, Hindus.
Coppery Red—American Indians.
Light Whites—Northern Europeans.
Dark Whites—Southern Europeans.

There is a very close relationship existing between the color of the skin, the color of the eyes, and the color and form of the hair. As a general rule, dark eyes only are found in all races except the white. Among white people the color of the eyes ranges from light blue through hazel to brown and black.

In a similar way, the white race is, in general, the only one to show wide variations in the color of the hair, although individual exceptions will occur to all these characters. Hair, in fact, in its texture and the shape of its cross section, furnishes the most accurate means of distinguishing racial traits, since there is a close connection between these two characteristics. Thus all the natives of North and South America, the peoples of Mongolia, Malaysia, and eastern Polynesia, have long, black, coarse, lusterless hair, the cross section of which under the microscope appears round or nearly round. There is no other one trait that is characteristic of so many hundreds of millions of peoples scattered over such a vast territory from the Arctic to the Equator.

Likewise the short black woolly or frizzy hair, the cross section of which is either elliptical, flat, or kidney-shaped, is characteristic of the Negro, Hottentot, Bushman, Negrito, Papuan, Melanesian, and Tasmanian, which groups together number over 150,000,000 members. The other types of hair, such

FIG. 5.—CROSS SECTIONS OF HAIR

as the black, brown, flaxen, red, are wavy or curly and have a cross section that is oval. This group prevails among the 700 or 800 millions of the Caucasian race.

The cross sections that play such an important part in the classification are shown in Figure 5.

In general the flatter the hair the more it curls and the rounder the cross section the coarser and straighter the quality.

The beard as a constant race character occurs only among the members of the white race, although there are two exceptions to this, the Australians and the Melanesians. A general rule is that the coarser the texture of the hair the less does it appear on the face and body.

The races vary in average height from about 4 feet 6 inches up to 5 feet 11 inches, and, as a rule, the female of the race is one-sixteenth shorter than the male. There are, of course, scattered small groups, like the Pygmies of Africa, whose height

is only 4 feet, but of the recognized races we find the Bushmen of Africa standing as the shortest and the Patagonians of South America as the tallest. Between these extremes come all the other peoples, but it is an interesting fact that the tallest race is but 25 per cent taller than the shortest. This uniformity of all races of man in regard to size contrasts sharply with the variations in other animal species. The great Newfoundland dog, for instance, is many times larger than the little lap dog.

Were we to go into the detail of the comparison of all body measurements of the different races we should soon fill a large volume, for there are many hundreds of them. However, our purpose will be satisfied if we discuss only a few of the most essential. As the head is the part that contains that most vital and delicate of all organs, the brain, and as the face is the part that tells much of the story of the individual's brain power, we will devote all of our discussion to the measurements taken on them.

It is possible to weigh the brain of the recently dead, or at least to measure the cavity in which it rested, and by a fairly constant proportion to tell its size. The brain weights vary in the human race from 43 ounces (1,220 grams) to 47.6 ounces (1,350 grams). The woman's brain of all races is about 5 ounces (140 grams) less than that of man.

It does not always follow that a heavy brain accompanies great mental power, but it is interesting to see that the brains of some of the great men of the world have been above the normal. The brain of W. M. Thackeray weighed 1,658 grams, Daniel Webster's 1,518 grams, Napoleon III's 1,500 grams, and Ivan Turgenev's 2,012 grams.

Very soon after death the brain shrinks so much that its weight is of no value. In most of the old skulls that scientists desire to measure the brain has, of course, disappeared. Hence they have to resort to methods of measuring the cavity at one time occupied by the brain. The simple method is to fill the skull with some substance such as dried peas or shot and then pour them out and measure them. The great difficulty lies in getting the peas, or whatever other substance is used, into the crevices and around the numerous bony projections on the inside of the skull. Water cannot be poured in, for it will run out through the openings, and so where this substance is used a thin rubber bag is first inserted and then filled.

The cubic capacity of the human skull varies from about 82 cubic inches (1,344 cubic centimeters) to 95.5 cubic inches (1,565 cubic centimeters). The female skull is from 6 to 12 cubic inches less than that of the male. The lower the skull capacity the nearer does the individual approach the animal type. As in the case of brain weight the skull capacity varies somewhat with the size of the body.

The cubic capacity of the male skull varies by age as follows: at birth, 370 cubic centimeters; two months, 540 cubic centimeters; one year, 900 cubic centimeters; three years, 1,050 cubic centimeters; ten years, 1,360 cubic centimeters; twenty years, 1,450 cubic centimeters.

Following are the cubic capacities of the skulls of some of the world's great men: Darwin, 1,650 cubic centimeters; Dante, 1,686 cubic centimeters; Schiller, 1,830 cubic centimeters; Byron, 2,055 cubic centimeters; Bismarck, 2,072 cubic centimeters.

It is a simple matter to find the brain weight, which averages about 87 per cent of the cubic capacity of the skull. That is, the brain does not fill the entire cavity but varies according to age.

In the three main races the brain weights and the skull capacities are as follows:

White—Brain weight, 1,360 grams (47.25 oz.); skull capacity, 1,565 cubic centimeters (93.5 cu. in.).
Yellow—Brain weight, 1,300 grams (45.5 oz.); skull capacity, 1,510 cubic centimeters (87 cu. in.).
Black—Brain weight, 1,250 grams (43.75 oz.); skull capacity, 1,440 cubic centimeters (82.2 cu. in.).

There are some fifty different measurements that can be taken on the skull alone, but we will concern ourselves with only four of them. The first is a

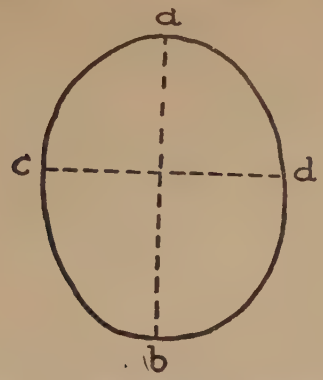


FIG. 6.—BREADTH AND LENGTH OF SKULL COMPARED

measurement taken looking down on the top of the skull. This varies with the races, and so it is necessary to get some means of comparing this difference. What we desire to do is to compare the breadth *c-d,* with the length, *a-b,* and in order that

the figures may be expressed in the same terms we will call $c\text{-}d = 100$. It is then possible to get a comparison and so we use this formula:

$$\frac{\text{Greatest breadth } (c\text{-}d) \times 100}{\text{Greatest length } (a\text{-}b)} = \text{what we call the skull index.}$$

These figures vary from 70 to 85. If the index should come out 100 it would mean that the top of the skull was round. When it comes out 85 it means that the skull is within 15 units of a circle. The lower the index the narrower the skull.

The racial variation is as follows: Black race, less than 75, called long head. White race, from 75 to 79.9, called medium head. Yellow race, from 80 to 85, called short head. That is, the yellow race

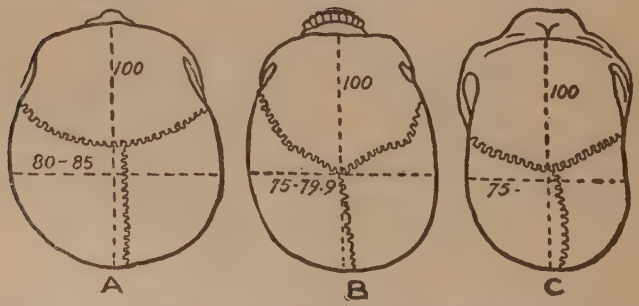


FIG. 7.—SKULLS OF DIFFERENT RACES COMPARED, AS VIEWED FROM THE TOP

(*A*) Yellow race; (*B*) white race; (*C*) black race

is the nearest approach to a circle, the white race next, and the longest, narrowest head is that of the negro. There is very little difference between the sexes in the measurements.

In comparing the physical characteristics of the ape and man we may divide the head into two

parts, the brain case and the face. The lower we go in the animal scale the greater is the preponderance of the face over the brain case. This likewise holds true among human beings, and we find that faces with protruding jaws belong more to the

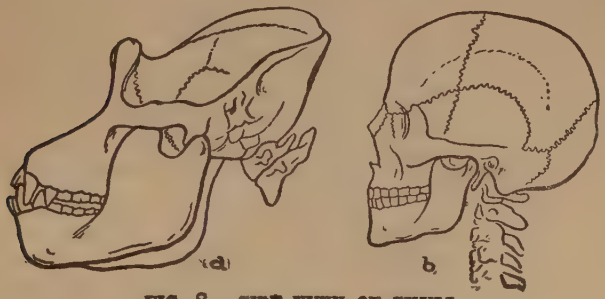


FIG. 8.—SIDE VIEW OF SKULL

(*a*) View of the skull of an ape; (*b*) view of the skull of a man

lower than to the civilized races. If an occasional individual is seen of this type among the whites we call him a "thug," for he has a heavy lantern jaw and low retreating forehead. This last characteristic gives him the name of "lowbrow" in distinction to the "highbrow, whose face is but an insignificant appendage to an abutting 'dome of thought'."

The measurement of this protruding jaw gives another method of classifying the races: that is, the angle made by the projection of the jaw from the profile. The three points used to get the angle are (1) from the narrowest point at the forehead between the eyes, to (2) the extreme point at the junction of the teeth, and from here to (3) the extreme point at the tip of the chin. It will be seen in the illustration that this gives the angle *A B C*.

The lower we go in the scale the smaller does this angle become, and the higher we go the more closely does it approach a straight line. In the black race the jaw is the most protruding and the angle is about 147 degrees; the next is the yellow race, with

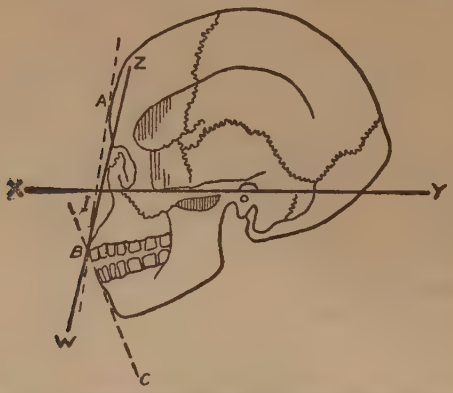


FIG. 9.—THE PROGNATHIC ANGLE, OR ANGLE MADE BY THE PROJECTING JAW

an angle of 154 degrees, and the last is the white race, whose angle more closely approaches a straight line with the figure of 160 degrees.

There is one great difficulty in using this measurement, for many of the skulls found have lost the lower jaw, and, therefore, the three points necessary to make the angle cannot be obtained. To overcome this difficulty one scientist discovered what he called the facial angle, the measurements for which can be taken entirely from the permanent portion of the skull. Three points were necessary in order to get the angle. He drew a line from the upper part of the opening of the ear to the lower part of the orbit of the eye. This line we will call X Y. His other line went from the root of the nose to the point

between the two front teeth on the upper jaw. This we will call W Z. The angle Y I Z is the facial angle and this approaches 90 degrees as we reach the more civilized races. In the black race it is 82 degrees and below, in the yellow race 83 degrees to 90 degrees, and in the white race 91 degrees and above.

One last physical feature that we will mention is the nose. Each of the three main races has a type that is distinct, not only in regard to the structure, but also as far as the shape and size are concerned. In taking the nasal measurement we use the same

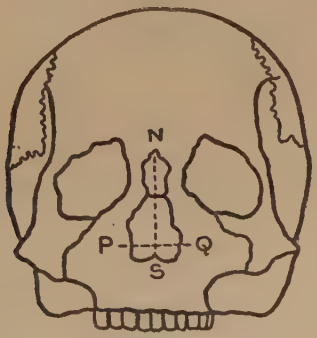


FIG. 10.—THE NOSE INDEX

method as employed in determining the shape of the top of the skull. Let the line representing the greatest length equal 100. We then get the proportion

$$\frac{P\,Q \times 100}{N\,S} = \text{the nose index.}$$

If this should equal 100 the nose would be as broad as it is long. In the lower races where the nose is very flat, the index is higher than among the races, such as the white, where the nose is long and narrow. This index varies in human beings on the

skull from 43 to 60. The negro, with his broad, flat nose, has an index of over 53; the yellow race has an index of 48 to 53; and the white race of 48 and under.

If these measurements are taken on the living the same method is used and the lines still measure the greatest length and the greatest breadth. The figures are a great deal larger than on the skull, for they range from 63 to 108. The negro is above 81, the yellow race 70 to 81, and the white race below 70.

The shape of the nostrils is certainly a well-marked racial characteristic. In the negro they are

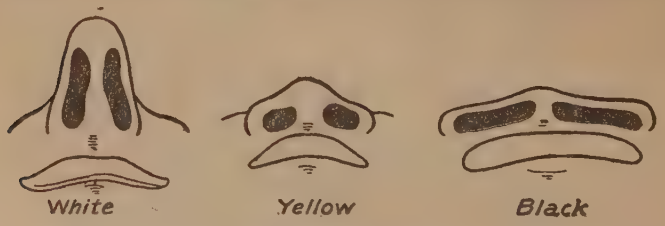


FIG. 11.—TYPICAL SHAPES OF NOSTRILS OF DIFFERENT RACES OF MANKIND

long, elliptical, and end to end, resembling very closely those of an ape; those of the yellow race are nearly round; while in the white race they are long, elliptical, and parallel.

Before taking up the subject of disease as a means of race distinction it is well to have clearly in mind the purpose of the present chapter. The members of the human family all belong to one species, but there are enough differences between the individuals to enable us to group them under the head of distinct races. Each one of these groups has certain characteristic features which distinguish it from all

the others. Many of these features always go together. If a race has the long narrow head it will also have the flat nose, small skull capacity, black skin, and so on. Given, therefore, any one of these criteria it is a simple matter to determine the rest. This is of enormous value in reconstructing from the few bones that are found the original form of the most primitive human beings. One of the earliest discoveries gave to scientists merely the top of a skull, a few teeth and a thigh bone. These, however, were of such a distinct character that they gave all the necessary clues to the construction of a model of their original possessor.

We turn now to the subject of the different diseases which characterize the various races. No matter where one goes in the world, from the coldest north to the hottest south, there will always be found disease. Man has been fighting it from the beginning, and the methods employed go all the way from the crude attempts of the savage man to drive away the evil spirits that, as he believes, cause it, down to the most modern attempts in surgery and medicine. We cannot here go into the causes of disease, nor the methods employed for curing it, but we do want to show, if possible, why some races are more afflicted than others.

In the chapter on evolution we spoke of adaptation to environment, and we saw that those individuals in the plant and animal world (exclusive of man) who lived, were the strong ones whose physical qualities were such that they were fitted to survive. Among the savage peoples natural selection also works to a large extent, but civilized man has built around himself such a great artificial environment of the arts and sciences that, except in rare cases,

natural selection has almost ceased to work. One of the exceptions to this is disease. While civilized man is better able to cope with it than the savage, and while he is able to ward off and cure many diseases, yet he has by no means conquered in the fight. Any of the epidemics, such as that of influenza in 1918, will show how far he is from the desired goal.

When a disease comes to a savage people who have few real methods of cure, a great number of them die, but some live. Those that survive have been exposed to it as much as those who succumb. The difference lies in the fact that they have what we call a natural immunity, that is, there lies within them some unknown quality which enables them to ward off the attack. Those who die carry this weakness with them to the grave, while those who live tend to pass on their strength to the generations that are to come. This does not mean that if the same disease hits the race some time later that a large number of the people will not die. It does mean, though, that if this process continues long enough there may come about a racial immunity whereby the ravages may not be as severe. Some years ago measles was brought to a tribe of American Indians. The result was most disastrous, for a large proportion of the population died within a very short time. The white race is in contact with measles all the time, but seldom does the disease prove fatal.

The black race living in the tropics is relatively immune to all tropical fevers (which are so fatal to the whites) and to cancer. Immunity from the first of these scourges may have come about through natural selection covering many hundreds or thousands of years. Immunity from the second may have

occurred in the same way, although in some races there seems to be an immunity against a disease with which, in their early history, they seldom or never came in contact. The white race, for instance, is more immune to sleeping sickness than are the blacks, although white peoples have seldom come in contact with it.

Nonexposure is one reason why some races do not have a disease. The Jews do not have trichina, which comes entirely from eating pork that is not properly cooked. Many of the plagues which so ravish the eastern world where the population is thick and where there are no laws of sanitation can be largely prevented in the white race by observing the simple laws of cleanliness.

The white race and the Japanese branch of the yellow race are the only ones where we find artificial immunity. They have developed serums to guard against attacks of smallpox, typhoid fever, and other diseases. They are not naturally immune to these, but by the use of preventives there is little reason why anyone should suffer from attacks. One of the diseases which causes the greatest death rate among the whites is tuberculosis, but yet as compared with the blacks, when they come in contact with the disease, our death rate is small. Every man, woman, and child in America is probably constantly exposed to this malady, but yet we do not all take it by any means.

If people move into an environment to which they are not accustomed, they will probably fall victims to the diseases of that country. This is well illustrated when the whites go into the tropics, or when the blacks come north. In the south the wastes of the body are thrown off largely by the skin, the liver,

the kidneys, and the intestines. The natives have these parts well developed to take care of the work that they are called upon to do. But the whites are relatively weak in this respect, so that when the organs of the abdomen are called upon to perform this great extra function to which they are not accustomed, they succumb at once, with the result that tropical fevers of all sorts, dysentery and like diseases, set in. On the Gold Coast of Africa the death rate among the English has reached as high as 680 per 1,000. The only way that the whites can live at all in the tropics is by taking every precaution, such as staying out of the sun, doing little physical labor, and consuming large quantities of medicine. It might be possible, after countless generations, for the whites to live in the tropics as the natives do and to be relatively free from those diseases which now prove so fatal.

In the north the body waste is thrown off largely by the lungs, and so those who are native to the cold regions have this part well developed. When the pure blooded negro comes into the north he more readily succumbs to pneumonia and tuberculosis than do the whites.

The following table taken from Professor Keller's work on "Race Distinction" gives a few of the diseases from which the main races are immune and to which they are susceptible:

WHITE RACE

Susceptibility—Fevers, especially tropical disorders; cancer.
Immunity (relative)—Ainhum, beriberi, elephantiasis, sleeping sickness, yaws.
Immunity (artificial)—Cholera, leprosy, plague, smallpox, tuberculosis (all these are *relative* immunities, depending upon the degree of knowledge and effort employed).

BLACK RACE

Susceptibility—Respiratory diseases (tuberculosis, pneumonia), tetanus, ainhum, sleeping sickness, yaws.

Immunity (relative)—Fevers (especially tropical disorders), cancer, trachoma.

YELLOW RACE

Susceptibility—Cholera, leprosy, plague, beriberi, smallpox, trachoma.

Immunity—Fevers and tropical disorders, ainhum, sleeping sickness.

RED RACE

Susceptibility—About the same as that of the yellow race, except that the eruptive and the respiratory diseases and tropical fevers are oftener present and are sometimes attended (e. g., measles) with high mortality.

Immunity (relative)—About the same as that of the yellow race, taking into account the foregoing.

BROWN RACE

Susceptibility—Beriberi is commoner. Otherwise similar to that of the yellow race, except that the Polynesians are much more susceptible to tuberculosis.

Immunity (relative)—Similar to that of the yellow race, except that plague is less felt and there is less of tropical fever, and the Malays suffer less from tuberculosis.

The subject of disease is a very interesting one, but yet as a means of race distinction it is the least sure of any of those which we have discussed. While medical science has advanced far, yet it is really in its infancy. So many new things are being discovered all the time that seem to overthrow the older ideas and theories. We really know nothing about the causes of immunity and there is a good deal of doubt as to whether any race is naturally immune to any disease. We do know, however, that some diseases are more fatal to one people than another and we are also sure that by the elimination

of dirt many illnesses can be avoided. The general conclusion to be drawn is that each one of the three main races has certain diseases which it seems to be more susceptible to and immune from than the other races. How much this is due to different environments and how much to some actual physical difference we do not know. Hence too much weight should not be given to these things which are still largely matters of speculation.

CHAPTER IV

RELATION OF MAN TO OTHER ANIMALS

WHEN Darwin first brought forth his theory that man was related to the lower animals there were many people who were horrified at the thought that they, who were made in the image of God, should in any way be connected with animals. The story of Adam and Eve was literally believed and the statement that God created man out of the dust seemed to prove conclusively that there was no relationship whatsoever with the beasts. The family pride of a good many people was hurt by the thought that they had in any way and at any time been connected with the apes, the highest of the lower animals. It was not until unanswerable scientific proof had demonstrated without the shadow of a doubt that man must be included in the great scheme of evolution that they were willing, reluctantly, to admit the facts.

It is not necessary for our purpose here to go into many of the details of the proofs, but it is important that we state some of the broader conclusions.

The further back we go in the history of an individual the more closely do we find him resembling the other animals. The statement is made that the human being from the one cell stage down to the time of birth has rapidly gone through all the stages through which the species in its development has

passed. A few words on the subject of Embryology will make this clear.

All of the vertebrate animals, that is, all that possess the backbone, began life as a single cell egg. For the sake of our comparison we will look only at the higher types such as the hog, the calf, the ape, and man. This single cell is fertilized and immediately begins to grow and divide into numerous cells within the one egg. As time goes on these cells move into an orderly arrangement, collecting into groups that later go to form the different parts of the body. It is not long before the form of the individual becomes evident, but if one examines the embryos of the above animals at an early stage it is difficult to tell which will ultimately turn into a calf and which to a human being. From this stage on the differences between some of them become more apparent. That is, it is possible to distinguish man from the calf, but it is still difficult to differentiate between man and the ape, or the hog and the calf. One famous writer on the subject has said: "It is a general law that the more closely any animals resemble one another in the adult structure, the longer and the more intimately do their embryos resemble one another; so that, for example, the embryos of a snake and a lizard remain like one another longer than do those of a snake and of a bird; and the embryo of a dog and of a cat remain like one another for a far longer period than do those of a dog and a bird; or of a dog and an opossum; or even than those of a dog and a monkey."

Just before birth all the animals have so far taken on their individual features that it is easy to distinguish one from the other. This does not mean, however, in any sense that man has lost all of the

characteristics that so closely allied him to his brothers in the animal world. Even after birth the higher vertebrate animals, man included, have the

FIG. 12.—THE EMBRYOS OF VARIOUS ANIMALS AND MAN IN DIFFERENT STAGES OF DEVELOPMENT

(After "Darwin and After Darwin" by Romanes)

same general structure and are possessed of similar organs. All of them have a spinal column to which the ribs are attached. It is divided up into segments or vertebræ on one end of which is the head and

at the other the tail, or the remnant of that organ. Each one has a heart that pumps blood through the body for the purpose of nourishing the various parts. We could mention the other bodily organs and show that they function in about the same way. This in itself should prove conclusively that man is closely connected with the lower animals, for if he were not, it is hardly conceivable that he should have so many things in common with the other members of the vertebrate world.

There are some organs in man for which there is no known use, but which in the lower animals have a very definite function. One of these is the appendix. In the animals it serves to secrete certain juices used in the digestive process, but in man it has no such purpose. Moreover, at the end of the human spine there are three or four small bones that constitute a rudimentary tail.

One common misinterpretation of Darwin's idea of the descent of man has done more to discredit the whole doctrine of evolution than anything else. It was said that he declared that man was descended from the apes. A moment's thought will show that he could not possibly have made such a statement. If man were descended from the apes, as we know he was not, it would mean that the apes had gradually changed until they became man. If there were no apes living to-day there might be some basis for this idea, but the fact that there are apes living now shows that they could not possibly have turned into man. What he did say was that man and the apes had a common ancestor and he called this individual—that scientists have been trying to find for many years—the Missing Link. How near they have come to this discovery will be dealt with in a

later chapter. If man is more closely related to the apes than to any other members of the animal world, it is important that we see wherein the similarity and difference between these two lies.

If a person stands for any length of time before the monkey cage in the Zoo, he will notice that one of the most frequent statements made by the spectators is, "How human they look!" It is fascinating to watch them put their hands through the bars of the cage to take a peanut, crack it with their teeth, pick out the meat and eat it as a human being would do. They look like small malformed and ugly editions of man. Of all the apes the ones that most closely resemble man are the chimpanzee and the gorilla, hence we will devote our description to these.

In measuring the vertebral column of a full-grown gorilla in a museum in London, Huxley found along the outside curve a length of 27 inches; the arm without the hand measured 31½ inches; the leg without the foot 26½ inches; the hand 9¾ inches, and the foot 11¼ inches. In order to make a relative comparison between the length of these parts of the body and the spinal column, we will call that part 100. On this basis the arm equals 115, the leg 96, the hand 36, and the foot 41.

If we call the spine of the average European 100, then the arm is 80, the leg 117, the hand 26, and the foot 25. Comparing these measurements with those of the gorilla we see that the arms of the ape are very much longer than his spine, but that man's arms are shorter; that the leg of man is longer than his spine, but the ape's leg is shorter. The gorilla's foot is longer and his hand much longer than man's.

The spine of the ape has a single curve, while that of man is shaped more like the letter S with a

double curve. Because of this shape the jar which would be carried to the head when man walks is eliminated almost entirely.

The pelvis, or bony girdle of the hips, differs in man very much from that of the apes. The flaring bones give support for the middle organs of the body such as the intestines, during man's habitually erect position, and also give space for the attachment of the great muscles which enable him to assume and keep that attitude. The accompanying illustration will show that the gorilla's pelvis differs very much from this.

The hole in the skull for the entrance of the spinal column is called the occipital foramen. This in the ape is far back of the center, while in man it is almost in the center. This fact, added to the double curve of the spine, explains the reason why man walks upright, while the ape, lacking these two qualities, is thrown forward on to all fours.

The methods of walking differ with the type of ape. Some go like other animals on all fours, others, because of their very long arms, put their hands on the ground and swing their bodies between them as would a man on crutches; still others touch first one hand to the ground and then the other. If an ape wants to go for any distance on two feet, it throws its arms over its head to keep its balance, and then rushes forward, but it really cannot go very far before coming down again. One of the great advantages to man—the fact that he can walk upright—is that it leaves his hands free for other things.

Although the hand of man resembles that of the chimpanzee in many respects, yet there are some striking differences. The thumb of this ape is

FIG. 13.—APE SKELETONS COMPARED WITH THE SKELETON OF MAN

(*a*) Gibbon; (*b*) orang; (*c*) chimpanzee; (*d*) gorilla; (*e*) man. (After Huxley)

farther down on the wrist and is shorter than that of man's, but it is opposable as in man's, that is, it can touch the tips of all the other fingers. In the case of some of the lower monkeys it is not opposable, but sticks out almost at right angles to the wrist. The ends of man's fingers have soft cushions that are nerve centers which enable him to have a very sensitive touch, but the tips of the ape's fingers are hard and callous. In man the lines of the hand run

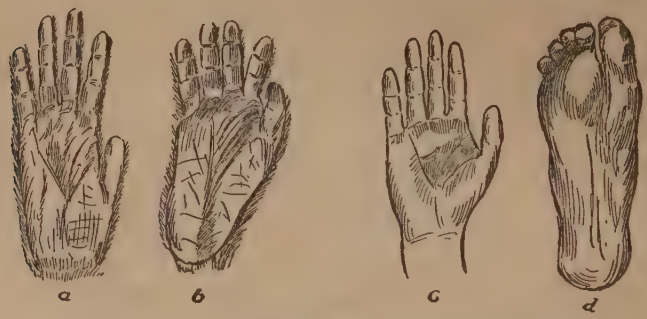


FIG. 14.—HAND AND FOOT OF CHIMPANZEE COMPARED WITH HAND AND FOOT OF MAN

(*a*) Hand of chimpanzee; (*b*) foot of chimpanzee; (*c*) hand of man; (*d*) foot of man. (From Tylor's "Anthropology.")

across while in some of the lower apes they run up and down. This may be due to the fact that so many of the apes run on the side of the hand, thus causing the lines to form in that way.

The feet of man and the apes show greater differences than do the hands, in fact, the foot of the ape is more like the human hand than is its hand. The most striking difference is that the great toe of the ape is opposable so that he can pick up objects with his foot. The foot of civilized man is almost entirely useless for this, but it is partially due to the

fact that it has so long been confined in shoes. Many of the savage peoples can use their feet for a variety of things besides walking. The Chinese boatman can pull an oar with his foot and the Australians will sometimes carry their spears with their toes in order to seem unarmed. Some years ago there appeared on the vaudeville stage a man who had lost both arms, but who had become so expert in the use of his feet that he could play the piano, sew, and feed himself with them. Even at best, owing to the stiff bony structure, the human foot is clumsy as compared to the hand or even to the foot of the ape. All the monkeys use the foot for grasping the limbs of the trees to aid them in climbing, but although they gain in this way yet they lose in their ability to walk.

There are many characteristics in the human child that very closely resemble the ape, but as it grows older they gradually disappear. In the first few months after birth the spine of the child has the single curve which, as we have seen, is common in the apes. The very young child has a remarkably strong finger grip enabling it to hold itself suspended from a strap for some time. The flexed thigh and leg are ape characteristics and the great toe stands away from the foot as in the case of the monkeys. The grasping power of the foot of the child is well developed, so that it can pick up and hold objects with its toes. The eyes of the child are far apart and the nose is flat and nonprojecting like the ape's.

The most important part of our comparison lies between the head of man and that of the ape. This bony structure contains the most delicate of instruments—the brain; and as it is this organ that raises

man to his place so far above the other animals, it is necessary for us to see something of its physical structure and its more simple processes of thought. The first thing that one notices on the skull is the very protruding jaw of the ape as compared to the almost straight jaw on the face of man. If the skull is divided into two parts, the face and the brain

FIG. 15.—TOP VIEW OF BRAIN OF CHIMPANZEE COMPARED WITH THE BRAIN OF MAN

(*a*) Chimpanzee. (*b*) Man. At the left of each figure the brain hemisphere is shown whole, at the right, in section. (After Huxley.)

case, it is readily seen that the face of the ape is very much greater than the brain case, while in man just the opposite is true. (See Figure 8.)

The brain of man differs from those of the lower animals in size and in the number of convolutions or folds. There is a variation among human beings according to the race, so that we find the weight ranging from 43 to 47 ounces, but the weight of the brain of the gorilla is only 20 ounces. That is, the brain of the lowest race of man is over twice as heavy as that of the highest ape.

Among the lowest animals the brain is almost smooth, but on each higher stage the brain becomes more and more wrinkled until man is reached, where the number and depth of the folds surpass all other members of the animal world. If one looks at the cross section of the brain, he will observe that, extending inward for some little distance, and following the crevices, is a shaded portion. This is called the gray matter and is the thinking part of the organ. Hence the individual that has the largest brain with the greatest number of deep convolutions will, of necessity, have the greatest amount of gray matter and thus will have greater thought power. The brain is the most complicated organ of the body, for in it centers all the activity, physical and mental. Limited space prevents us from going more into detail in regard to its structure, but the main point to be remembered is that because it is so highly developed it raises man to a plane far above even the most intelligent animal.

The emotional natures of man and the animals spring from the same basic impulses, but their means of outward expression are different. Man, because of the complicated system of muscles underlying the flesh of the face, is able to show hate, joy, love, mirth, jealousy. Since the moving pictures have come to be such an art, we realize how many of the emotions can be registered by the face alone. However, the expression of a person who is weak-minded tells at once the story of the subnormal brain, although the muscles of the face may be able to function properly. As we go down lower in the human scale to the most savage of peoples, we find that the facial expression shows that the brain

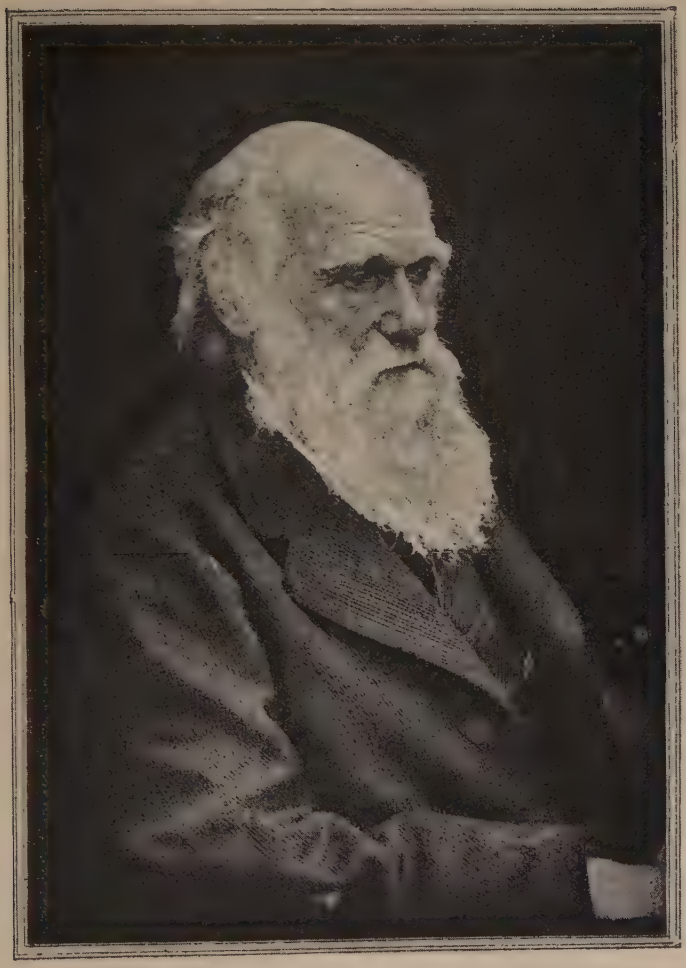
is not highly developed. When we get down among the animals, the fact that the skin is drawn tightly over the bones of the face, and the fact that the brain power is weak, account for the inability of the animals to express by the face any but the most elemental emotions. The monkey can draw back the corners of the mouth and wrinkle the lower eye

FIG. 16.—TYPES OF WEAK-MINDED INDIVIDUALS

(From "The Criminal," by Ellis.)

lids to express joy, and rapidly raise and lower the eyebrows and forehead to indicate anger.

But this does not mean that the animals are not able to express their feelings even though they use different methods from man. When a dog approaches an enemy his whole bodily expression is different from that displayed when he sees a friend. In the former case he goes forward with body stiff, head slightly raised, tail erect and hair bristling. In the latter the body is crouching while the lowered tail wags, the hair is smooth, and the ears are drawn back and depressed. Most animals show fear by the trembling of the body, pale skin, hurried breathing, and rapid heart beats. Pain is expressed by dogs in about the same way as by many other animals. That is, by howling, writhing, and bodily contortions. Darwin says: "With monkeys



CHARLES DARWIN

AN EXAMPLE OF PROTECTIVE COLORATION—SNIPE ON NEST

the expression of slight pain or any painful emotion, such as grief, vexation, jealousy, is not easily distinguished from that of moderate anger. Grief, however, with some species, is certainly exhibited by weeping. The young female chimpanzee in a violent passion presented a curious resemblance to a child in the same state; she screamed loudly, with widely opened mouth, the lips being retracted so that the teeth were fully exposed; she threw her arms wildly about, sometimes clasping them over her head; she rolled on the ground and bit everything within reach."

There are three main act-producing processes which are called reflex, instinct, and reason. Man possesses the reflexes in common with the animals. He will remove his hand rapidly when it has been burned by fire, he will close his eyes when anyone pretends to hit him in the face, he will sneeze and cough. All these things are responses to local stimuli and occur in the animals in a similar manner. There is a great deal of doubt as to what instincts a man possesses, but in animals all actions that are not caused by reflexes are the result of instincts. In the case of man it is said that he has a few instincts, but that most of his thoughts and actions are the result of reason. Instinct is a quality born with a person while reason comes from conscious life experience.

The word instinct in human beings is used unintelligently. Hunger is spoken of as an instinct, whereas it really is a reflex caused by the contracting of the sides of the stomach. A great many actions, which in animals are ascribed to instincts, when carried out by man, are said to be due to reason. Psychologists are not agreed as to where

instinct stops and reason begins, for in many cases the dividing line between these two is very slight.

If man showed every fall a desire to go into a warmer region, as do the birds, it might prove of less benefit to him than the conscious reasoning whereby he adapts his actions to the climate by building houses, wearing clothes, and collecting food. Possibly, man in the earliest years of his development possessed many instincts, but if so, time and change have pretty nearly eliminated them from his makeup.

Man, with the animals, is possessed of the ability to gain new knowledge and he, as well as they, learns by experiences. For instance, certain animals after being caught in the traps of the hunters learn to avoid them, if they have been fortunate enough to escape. This knowledge they will frequently teach to their offspring, and sometimes they become so clever that they can extract the bait without springing the trap.

Imitation likewise plays a large part in the education of man and his animal brothers. The mother bird shows the little ones how to fly by fluttering in front of them. One ape in a zoölogical garden saw how the door of her cage was unlocked, and not only did it herself, but also hid the key under her arm so that she could use it when no one was looking. She watched a carpenter boring holes and then she grabbed the brad awl and bored holes through the table upon which her meals were served. A dog, after seeing his master unlatch the gate many times, will finally do it himself without much trouble.

A child is very imitative, in fact much of its early life is spent in learning by copying others.

So in the childhood of the race much of the knowledge and all the discoveries were passed on by one generation's imitation of what those before had done.

There are a great many people who believe that some of the animals have reason, for certain actions seem to show a higher thought process than can be ascribed to instinct. A gentleman was bringing home in his cabin on the steamer a gibbon. This animal had an inclination for removing things from their proper places, especially a piece of soap, and for this he had been scolded several times. "One morning," says Mr. Bennett, "I was writing, the ape being present in the cabin, when, casting my eyes toward him, I saw the little fellow taking the soap. I watched him without his perceiving that I did so; and he occasionally would cast a furtive glance toward the place where I sat. I pretended to write; he, seeing me busily occupied, took the soap and moved away with it in his paw. When he had walked half the length of the cabin, I spoke quietly, without frightening him. The instant he found I saw him, he walked back again and deposited the soap nearly in the same place from whence he had taken it. There was certainly something more than instinct in that action; he evidently betrayed a consciousness of having done wrong by his first and last actions—and what is reason if that is not an exercise of it?"

A female chimpanzee saw a hunter approaching. When she found that she was discovered she remained to protect her child. As the man raised his gun to fire she motioned with her hand just as a human being would have done to have him desist and go away. If a young ape is wounded, its mother

will try to stop the flow of blood with her hand, or, failing in this, will fill the wound with grass and leaves. One day a dog was out hunting with his master when the gun accidentally went off, seriously wounding the man. The animal realized that something was wrong and, after looking at his master for a moment, went home and brought back help.

These are only a few of the thousands of stories that could be told to illustrate the fact that if animals do not have reason they have something very close to it.

The process of reasoning is the most important function of the brain and it increases in power as one passes to the higher civilized races. It is one of the great things that differentiates man from the other animals. Nine-tenths of his action can be ascribed to this attribute, while if some few of the higher animals do possess it in a very rudimentary form, its importance is almost negligible.

Of all the animals man is the only one that has a definite form of speech. This he has developed through his greater brain power and through his process of reasoning. If it were not for language, civilization would indeed have developed slowly, if at all, for only through its agency has the knowledge of the world been passed on. Many scientists feel that it is this attribute of human beings that raises them above the rest of the animal world. How important language has really been to man will be discussed in a later chapter.

CHAPTER V

THE ANTIQUITY OF MAN

ONE problem that has bothered the students of anthropological science more than almost any other is that of determining whether man is a newcomer on this earth or whether he goes far back into antiquity. Those who still cling tenaciously to a literal interpretation of the Bible, are firmly convinced that man sprang into being as we know him to-day, only a few thousand years ago. This means that his mind was fully developed so that he was able at once to make use of the things in his environment. A picture that hangs in a museum in Paris well illustrates this idea. It is entitled "Cain" and shows a group of people of splendid physique with faces of high intelligence, on the march. They are all clothed in the skins of animals and the men are carrying spears and axes. On a litter, borne by some of the men and covered with the skins of animals, are a woman and two children. Behind her are the carcasses of some big beasts. All this development, physical as well as mental, is supposed to have taken place in the second and third generations of man on the earth.

Another theory, which, if true, would do away with the need of accounting for any very great age of man on the earth, is called the Separate Origin Theory. Briefly, it states that man sprang into being in the different parts of the earth where we find him to-day. That is, the black race originated

in Africa, the yellow race in Mongolia, the red race in America, the brown race in the Malay Islands and the white race in Europe. If it were not for the fact that all the peoples of the earth show such close relationship to each other in physical structure and in the working of the mind, there might be some basis of truth in this idea.

If we accept the evolutionary theory, which all scientists do to-day, we must place the origin of man far in antiquity. It is our purpose here to trace his development back through the ages, to the point where we first find him appearing. It was in these prehistoric times that the chief work of spreading from one continent to another was done by man. We are going to pull aside the veil that separates the historical from the prehistorical, for only by so doing can we obtain a correct picture of early man.

We must leave for the moment the science of anthropology and turn to geology, which is the science that deals with the mineral and rock structure of the earth. This world of ours, the surface of which is now covered with mountains, plains, valleys, rivers, seas and lakes, was at one time a molten mass of material of little form or shape. Gradually it cooled, and an outer crust was formed, but as it did so it shrank and the surface became wrinkled like the skin of a dried apple. The high portions became the mountains and the lower parts the valleys. The vapors that were dispersed in the atmosphere condensed on the surface, making the water of the sea and the lakes. This all happened so long ago that no one can give any accurate figure as to the time, but it must have been many billions of years.

Starting with that time geologists have divided the changes which have taken place in the rocks into

what are called Geologic Periods. Through long ages the original stones were worn down, others were formed through heat and pressure, until the time was ultimately reached when the earth was ready to support life. How it is supposed that this first came about we cannot discuss here. The interest of the present volume lies in the time after life began, especially its higher forms. Scientists have placed various figures as to time when life first dawned on the earth, but the latest statement is: "If it be assumed that the lowest forms of life began shortly after the earth's surface was fitted to support them, then instead of evolution being compressed into less than a hundred million years, it is stretched out over a period of the order of 1,500,000,000 years."

Quaternary	2. Recent Alluvium	Geologic present
	1. Old Alluvium	Ice age
Tertiary (Cenozoic)	4. Pliocene	More than one-half the species still living
	3. Miocene	20 to 40% of the species still living
	2. Oligocene	No species or not more than 5% still living
	1. Eocene	
Mesozoic	3. Cretaceous	First mammals
	2. Jurassic	Age of reptiles
	1. Triassic	
Paleozoic	5. Permian	
	4. Carboniferous	First amphibians and reptiles
	3. Devonian	Age of fishes
	2. Silurian	Cryptogam forests
	1. Cambrian	First life
Archæozoic		No trace of life

If the reader will look on the accompanying chart he will see that the geologic ages since this time are called Paleozoic, Mesozoic, Tertiary and Quaternary.

It is not necessary to mention those that occurred before this. According to the most modern theories man did not appear until we reach the Quaternary, in which age we now are living. There are, however, some who claim that he first appeared in the last of the Tertiary.

It will be seen that the Quaternary began with what is called the Ice Age. It is largely on the basis of the changes that took place during this period that we form our conclusions as to man's age, hence it is necessary to discuss this period somewhat in detail.

Since the dawn of history, that is, since writing began, the changes that have taken place on the surface of the earth are comparatively unimportant. Sand has been washed from one part of the coast and piled up on another, lakes have dried up, volcanic lava has formed islands, but these as compared with the great upheavals of nature before man began to write, are as nothing. There have likewise been small climatic changes, but even these do not compare to the variations of heat and cold that occurred before history began.

One series of these climatic changes brought about what we call the Glacial Period or the Ice Age. Four distinct times did the climate become so cold that great sheets of ice came down from the north and from the mountains and covered a good part of the world. Between these periods the climate moderated so that the ice retreated before the advancing warm weather. The cause of these changes is unknown although numerous theories have been advanced to account for them.

A glacier occurs in a region where more snow falls than melts. At the present time the snow line

in the tropics is 16,000 feet above sea level, while in the arctic regions it is at the water line.

There is some divergence of opinion as to how long ago the ice started to creep down from the north, but the best evidence seems to prove that it was anywhere from 520,000 to 840,000 years. As we have said, there were four great glacial periods, and between each of these was an interglacial time of warm weather. The approximate length of time that each of these lasted is as follows:

	Postglacial Period (Present Time)	25,000 years
IV.	Glacial Stage	25,000 years
	3d Interglacial Stage	100,000 "
III.	Glacial Stage	25,000 "
	2d Interglacial Stage	200,000 "
II.	Glacial Stage	25,000 "
	1st Interglacial Stage	75,000 "
I.	Glacial Stage	25,000 "

At the beginning of the first ice age the snows that rested on the mountain tops gradually crept down toward the valleys to meet the advancing ice sheet from the north. All life, animal and plant, was slowly crushed out of existence or driven into warmer climates. This change took place very slowly so that animals and plants of the temperate region gave place to those of a colder north and finally to the extreme arctic types. As life was crushed out of these forms of life, their usefulness did not cease, for they became fossilized and have thus remained until to-day to tell us of their existence. It is partly from these remains, combined with the kinds and character of the sediment brought down from the north, that we are able to give these figures as to time.

As the glaciers retreated, they left imbedded in the rocks some of the animals and plants which they had exterminated. These, in turn, added a second chapter to our story. The climate became warmer, in places tropical, so that there wandered into Europe all kinds of equatorial life, many traces of which remained as before, when the ice advanced again, to tell us what had once existed there. And so this process went on for over 500,000 years, each group of plants and animals leaving for us the story of its occupation as it was driven out by the climatic changes. In some places there are distinct layers of earth of many feet in thickness that tell to the skilled observer a story so true, so filled with romance, that even the greatest skeptic must be interested. When along with these prehistoric animals and plants we find remains of human beings and their stone implements, the evidence for the age of man is conclusive. But we will have more to say of this later.

During the farthest advance south of the ice in Europe we find that the line started in the west with the whole of Ireland, ran across from Bristol Channel to London, thence to what is now Antwerp, through Magdeburg, Cracow, and Kiev to the south of Moscow, and then ended at the southern end of the Ural Mountains. All land to the north of this line was buried under a vast sheet of ice.

North America was also covered by glaciers. "The great terminal moraine which marks the southern boundary of the ice can be traced with occasional interruption from Nantucket, through Long Island past New York, toward the western extremity of Lake Erie, then along a sinuous course in the same direction as the Ohio, down to its

FIG. 17.—EUROPE DURING THE PERIOD OF MAXIMUM GLACIATION

The black area represents land; the white, ice; the shaded, water; the broken shaded area shows drift ice.

confluence with the Mississippi; then it follows the Missouri as far as Kansas City, and beyond runs approximately parallel to that river, but south of it, through Nebraska, Dakota, Montana, and Washington, where it meets the coast north of the Columbia River. Within this boundary nearly the half of North America was buried beneath a thick sheet of ice, flowing more or less radiately outward from a central region situated in and about the region of Hudson Bay."

Between the first and second ice periods England was a part of the continent of Europe, so that the Thames was a tributary to the Rhine. What is now the North Sea was probably land. This interglacial period was warm, so that there wandered through this region the rhinoceros, saber tooth tiger, elephant and bison. We cannot say that during this epoch the climate was of necessity equatorial, for it is quite probable that both the hippopotami and rhinoceroses were protected by a hairy covering. They did not have the thick undercoating of wool that characterized the woolly rhinoceros and the woolly mammoth, animals which were found on the borders of the glacier. It does not seem necessary for our purpose here to take up these various phases of the Ice Age more in detail. We could, of course, describe how far the glaciers came down into Europe at each stage and tell of the plants and animals found in the various strata of gravel. But to do so would take us too far away from man.

Because we have taken this time to discuss the Ice Age it must not be supposed that all the discoveries have been made in glacial regions. Many of the most valuable finds have been made in caves and along river banks which were probably untouched

by the ice. The methods employed in both of these cases will now be taken up. As the work carried on in Kent's Cavern at Torquay in Devonshire, England, shows the way in which all cave work is done, it will be described somewhat in detail.

Kent's Hole, as it has been known for a long time, is situated in a small limestone hill a mile from the harbor of Torquay. The cave, which has two entrances in the face of the same cliff, consists of two parallel divisions that are connected at the inner end. Each part is made up of several galleries and chambers, but the work done so far has been confined to the eastern division. This section is 285 feet long, with a maximum breadth of 90 feet and a height of 22 feet. The floor of the cave is made up of different kinds of deposit, in which the animal and human remains have been found.

Before starting the work of digging it was necessary to make certain that the floor had never been disturbed. An upheaval of the earth might have thrown an upper layer far beneath the surface, thus putting any modern things it might contain at a very low level. As the age of the finds are determined in many instances by the depth at which they are buried, such a precaution is necessary. There are also many practical jokers in the world who enjoy fooling the people by burying bones or other objects at a great depth, and then, in the presence of scientists, "discovering" them. In the case of Kent's Hole the investigation showed that it had never in any way been disturbed, hence whatever was found there was genuine.

The floor of the cave is made up of the following layers: The present surface consists of a band of black mold which varies in thickness, in different

parts of the cave, from a few inches to a foot. Under this is the granular stalagmite floor, which is from one to three feet thick. The structure of this will be described shortly. Below this, occurring only near the entrance to the cave, is the black band, which is about four inches thick and is made up of fragments of charred wood. Still farther down is a layer of red cave earth, from four to six feet in thickness. Under this, in places, is the crystalline stalagmite which varies from three to thirteen feet. The breccia, which comes next, and is several feet in thickness, is situated on top of the limestone rock. All these layers do not occur in all parts of the cave, but the majority of them are fairly regular in their distribution.

KENT'S CAVERN, DEVONSHIRE

A.—Black mold . . .	Thickness—a few inches to a foot
B.—Granular stalagmite floor	Thickness—1 to 3 feet
C.—(In one locality) black band	Thickness—a few inches
D.—Red cave earth . .	Thickness—4 to 6 feet
E.—(In places) crystalline stalagmite .	Thickness—3 to 13 feet
F.—Breccia	Thickness—several feet
G.—Limestone rock . .	

We will start now from the top and go down as though we were digging, describing the various things found and the evidences for their antiquity. We enter the cave armed with large and small digging implements and lighted by candles and lamps, for only at the mouth is there any daylight.

In digging through the black mold, which is the present floor, we find objects ranging all the way from a modern shaving mug, through Roman coins,

to articles of a pre-Roman period. There are included in this motley collection human bones, teeth, and skulls; remains of the bat, rabbit, pig, and sheep; marine shells like those found to-day in the bay, amber beads, bone awls, bronze rings, spearheads, and numerous other like things. The age of this layer cannot be less than two thousand years and it may have been a great deal more.

Having gone through this first layer we now reach the granular stalagmite floor. This is deposited by water dripping from the roof of the cave and forming on the floor a layer of calcium carbonate. There are found in this layer the bones of the extinct cave bear, cave hyena, rhinoceros, and mammoth. Likewise flint flakes and implements are discovered. By far the most valuable find is a portion of a human upper jaw containing four teeth.

In trying to determine the length of this second period we find difficulty in deciding whether the black mold started to form as soon as the stalagmite had ceased. It is an interesting fact that of the animal bones found in the black mold not one belongs to an animal now extinct, while of those in the stalagmite layer there are at least four species that no longer exist on the earth to-day. If we suppose that the last layer started to form at once, we must account for the sudden disappearance from the earth of these several species of animals. This we cannot do. Hence it is safe to assume that a long time elapsed between the ending of the stalagmite layer and the beginning of the black mold. Evidence of an indubitable character has been left to us to show the rate at which this stalagmitic material is formed. As we said, this deposit is made by water slowly dripping from the roof and leaving the calcium,

which it bears in solution, on the floor. Sometimes there is not more than a drop a day, for if the drip were very rapid, the solid material would be washed away instead of being deposited.

On a great column of this material there is the inscription "Robert Hedges of Ireland, 1688." It is in a part of the cave where the drip is rapid. Exact measurement shows that just one-twentieth of an inch of deposit has formed in nearly two hundred and fifty years. Not far from this date is an older one, "William Petre, 1571." That both of these men lived at the time indicated has been proved by town records. How little these men realized when, in a casual moment, they scratched their names in that cave that they were doing so much for future science!

It is almost incredible to think how far back into the early history of man these deposits take us. In many places the floor is three feet thick, and the column upon which the first inscription was made is 13 feet thick. We shall not try to figure the number of years which have passed since the human remains found at the bottom of these deposits were placed there. Possibly in earlier times the rate of formation was slower or faster than we find it at the present time. However, members of the British Association for the Advancement of Science, who have been working in the cave, feel that the rate of deposit going on now is as rapid as it can be, and that, if anything, it was slower in the past.

The next layer is the black band, which occurs only near the mouth of the cave. It represents the place of the camp fires around which men gathered to cook their food and to prepare their weapons for the chase. Here the women scraped the skins of the

Photo, from Author

PILTDOWN PLACE

Photo, from Author

KENT'S CAVERN

animals and made them into clothes. When they departed they left for us to find at least 350 flint implements and flakes, pieces of charred bones and wood, well-formed bone tools such as an awl, a fish spear barbed on one side, a needle with an eye large enough to carry fine twine. Beside these evidences of human art there were the bones of the bear, cave hyena, rhinoceros, horse, ox and deer.

"Not only do the numerous bits of charcoal indicate a long series of fires, the charred bones imply meals of roasted food, and the flint flakes and chips point to industrial occupation, but the area of the black band was such as to secure its being selected by men as the favorite apartment of their cavern home. From its proximity to one of the external entrances, the light of day would be available; it is not subject to any inconvenient amount of drip, even in the wettest seasons; and there is always a sufficient current of air passing through this branch of the cavern to prevent discomfort from smoke when a fire is burning. Fire, moreover, would be needed for cooking, and perhaps for scaring wild beasts; but not to make the cavern tenantable, unless the black band represents a cold era, for at present its temperature throughout the day and night, in summer and winter alike, stands permanently at 52 degrees F., or about half a degree above the mean annual temperature of the district."

Beneath the black band is the red cave earth. This contains the remains of many animals such as the horse, the rhinoceros, and the cave hyena. The bones are all intermingled, with no evidence of anything approaching a complete skeleton. Possibly these animals came in here and died, and thus their bones piled up; but what is more likely is that they were

put there by man after he had devoured the meat. What makes this latter theory seem probable is that mixed with all of these fragments of bone are human implements. Oval or canoe-shaped pieces of flint, which were chipped with great care, but which have no trace of polish, are found together with bone pins and harpoons.

The red cave earth, which gives this layer its name, was washed in slowly from the surrounding country, either through minute cracks in the roof, or through the two external entrances to the cave. It is obvious that the earth did not come in all at one time, nor was it the deposit of a river flowing through. If it had been brought in by a river, all the bones and implements would be pointing in one direction. But as it is, they are lying at every possible angle. Many of the bones at each level of the red earth are covered with a thin coating of stalagmite deposit, showing that they must have remained in position a long, long time before they were covered up by more particles of earth.

The last two layers are the old crystalline stalagmite and the breccia. Although the former contains no inscriptions, yet the evidence seems to prove that the rate of deposit was as slow as that of the granular stalagmite. In places the floor is 12 or 13 feet thick, and here there have been found the remains of the cave bear. There is no way of determining how long it took the breccia to form, but it must have been a very great while, for the large and small particles of which it is formed are cemented together, making a solid mass. The only bones found here are those of the cave bear, but evidence of human occupation is not lacking, for a flint chip

was found buried three feet deep in the layer. Below this layer lies the solid rock.

It is from all these inanimate objects, buried so deep in the floor of a cave, that we are able to get a picture of the life of those early inhabitants of England. Without doubt they were a hunting people who were able to bring down big game, for we find not only the weapons that could have been used for such a purpose but also the charred bones of the animals near the fire. No one cave served as a permanent home, for they wandered from place to place as the food gave out. In such a climate as England had then, at least forty square miles would be needed to support one person, and for a group as large as ten at least four hundred square miles would be required. As soon as they left one cave, in all probability the animals would take possession of it, only to be driven out when the human occupants returned to live there.

These people did not know the use of metals, and although they carefully chipped the stone for their tools, yet they did not polish them. Besides these implements they made awls and fish spears of bone, the latter being very skillfully fashioned. Without doubt they wore clothing of skins, sewed with bone needles, and they fastened their dress together with heavy bone pins. It is interesting to note that, as no engravings or sculptures have been found, they must be regarded as inferior to their French contemporaries. To what race they belonged is unknown, but it is very evident that they had advanced at least some distance up the ladder of civilization. Hence, although they lead us way back into antiquity, they stop far short of the first appearance of man upon the earth.

There are numerous caves in the world that tell as conclusive a story as that of the one we have just discussed. The methods employed, however, are in all cases very similar, and so we will leave them for the time being, and turn to other places that hold for us a picture of the dawn of civilization.

The banks of rivers yield to us many specimens that tell the story of the early inhabitants who wandered to and fro on their hunting expeditions. Rivers are constantly overflowing, leaving each time small deposits of mud in the valleys. Some years ago, while excavations were being made along the valley of the Nile, two baked bricks were discovered, one buried at the depth of twenty and the other at twenty-four yards. If we suppose that the Nile deposits sediment at the rate of eight inches every hundred years, then the age of the first brick is 12,000 years and that of the second 14,000 years. Man had developed far up the scale of civilization when he began to make bricks, and it is therefore claimed by one scientist that at least 72,000 years have elapsed since man first put foot in Egypt.

Rivers are constantly working by building up land in one place and tearing it down in another. During the interglacial periods, when the snows were melting, there was a great deal of water in the streams. This caused them to flow rapidly and thus to wear the beds down. When the period of glaciation appeared the water in the river decreased, and so they were able to deposit the sediment. The result of this constant depositing and wearing away was the formation of a series of river terraces. When animal and human remains are found in these deposits it is possible to tell at about what period they were alive. There are, of course, many chances for the

unskilled explorer to make mistakes, and to think that because he finds various articles buried in the ground at some depth, they must be of great antiquity. He may have discovered a forgotten burying ground of no very ancient date. It is always possible to guard against such a mistake as this by

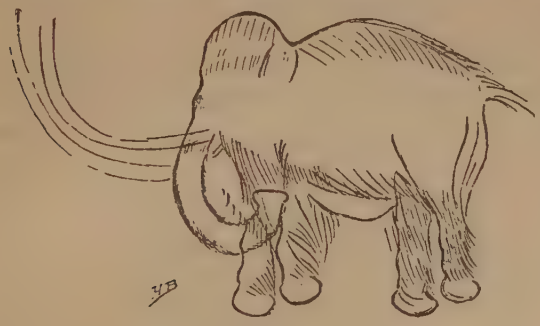


FIG. 18.—ENGRAVING OF A MAMMOTH

From Dordogne, France. (Courtesy American Museum of Natural History)

determining whether the ground has at any time been disturbed. If the soil is in layer formation, made up of different kinds of materials, it is a fairly simple matter to determine whether these strata have ever been penetrated. The character of the implements found would always tell the scientist whether he had discovered something fairly modern or of great antiquity.

The question is frequently asked, how is it possible to tell that man occupied the earth at the same time as some of the prehistoric animals? The bones of both of them may be found intermingled in the far recess of a cave. But this fact does not necessarily prove the point. If there is no deposit of any kind in the cave, such as stalagmite, that might

cover up the bones, there is nothing to prove that they belong to the same era. The mammoth might have gone in and died there. Thousands of years after, the body of a man might have been laid to rest there by his friends, beside the huge beast. Still later, modern man comes along and finds the two intermingled and says that there lies the proof that they lived at the same time.

Where the bones of the two are found together in the same earth strata we have a better piece of evidence that they lived together. However, when we

FIG. 19.—SKETCH OF MAMMOTH ON BONE

From cave of La Madeleine

find a picture of the mammoth drawn on one of his own bones by primitive man, the evidence is conclusive that they existed at the same time. Such pictures have been found, and we can almost see the man sitting at the door of his cave, armed with a piece of bone from an animal that he has consumed and a sharp stone, sketching one of the huge beasts as it feeds in the valley below. He little realized as he did this drawing what valuable work he was accomplishing, for by it we are able to prove a point that might have remained unsettled forever.

The forests of Denmark, past and present, unfold for us a story of early man's habitation of that country. The common tree growing now is the beech, and it has been so within the times of tradition. But

the peat bogs of the country reveal to us much of the past. These bogs vary from ten to thirty feet in depth and contain many trunks of trees arranged, of necessity, in chronological order. In the topmost layer is found the common oak, below this another species of the same tree, and still farther down the Scotch fir. In order to compute the time since the first growth we must allow enough years to pass to enable a forest to grow up, flourish, die, and another and still another to pass through the same cycle. Eighteen hundred years ago the Romans found the beech, the kind now living, in a flourishing condition. If we assume that each of the species of trees mentioned flourished for over two thousand years, we are carried at least five thousand years back in order to reach the firs that at one time covered Denmark. Man evidently existed there at that time, for polished flint implements have been found under the trunks of these trees. When man had begun to polish his tools and weapons he had advanced to a civilization far above that in which he merely left them in the crude chipped state. Thus our ever-increasing proof seems to place man's entrance upon the stage of civilization back when time can be counted only in geologic ages.

CHAPTER VI

THE CAVE MEN AND THEIR ART

SCIENTISTS have been searching for a long time over much of the world for primitive human remains. It is their desire to find examples of the different stages in man's development so that the series from the most apelike being down to modern man may be complete. This search has led them from the tropics to the north, but the greatest results have been obtained from Europe. This does not mean that the finds from other parts of the world have not been of extraordinary value. In fact, the most primitive of all the individuals was found in the island of Java and has been called by the very long name of Pithecanthropus Erectus. This, when translated into English, means "an apelike individual that walks upright like a man."

While digging along the Bengawan River in central Java in the year 1891, Dr. Dubois, a Dutch army surgeon, who was searching for prehuman remains, came upon a single wisdom tooth. Later he found, some little distance away, the top of a skull, a left thigh bone, and a second molar tooth. These were enough to enable scientists to construct a figure of the individual to whom they originally belonged. A fight has raged ever since as to whether it was a low type of man, a high type of ape, or the missing link between the two.

It is obvious from the thigh bone that the individual walked on two legs upright like a man, thus giving him free use of his upper extremities for touching and wielding weapons. This power is not possessed by the apes.

From the reconstruction of this creature we are able to get some idea as to his skull capacity and to

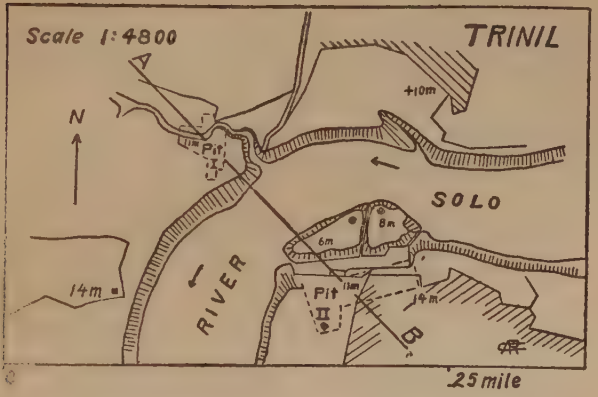


FIG. 20.—EXCAVATIONS AT TRINIL, JAVA, ALONG THE SOLO OR BENGAWAN RIVER

(*A-B*), Line of geologic section. ■ Monument. •○ Places where remains of Pithecanthropus Erectus were found. (After M. L. Selenka)

compare this with that of man and the apes. According to Dubois it was about 855 cubic centimeters, while the skull capacity of the largest ape is only 600 cubic centimeters. The lowest skull capacity of man that has ever been recorded is 930 cubic centimeters. Hence the Pithecanthropus stands between the highest ape and the lowest man.

A careful study of the human brain reveals the fact that different portions of it are used for different functions, such as memory, speech, etc.; hence,

if any brain section is lacking, or for any reason it is not in use, the individual will be deficient in some particular function. His undeveloped forehead and small frontal brain area indicate that the Pithecan-

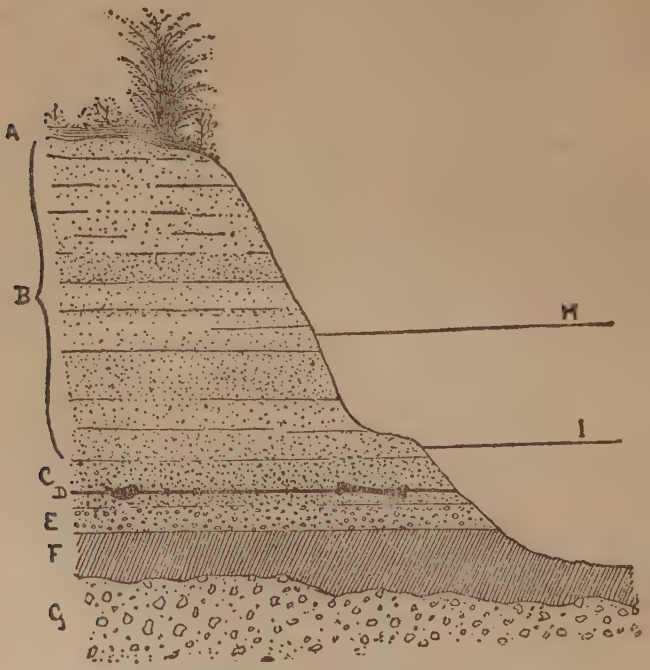


FIG. 21.—STRATA WHERE PITHECANTHROPUS ERECTUS BONES WERE FOUND

(*A*) Growing plants. (*B*) Soft sandstone. (*C*) Lapilli stratum. (*D*) Level at which bones were found. (*E*) Conglomerate. (*F*) Argillaceous rocks. (*G*) Marine breccia. (*H*) and (*I*) Levels of river in wet and dry seasons. (Hrdlcka. Courtesy Smithsonian Institution.)

thropus, and the race to which he belonged, had a limited faculty of profiting by experience. On the other hand, as in the ape, the areas of touch, taste, and vision were well developed. The area in which

the power of speech resides was only half as well developed as that of man, but twice as large as that of the ape. The general conclusions seem to be that this individual stood halfway between man and the ape and, therefore, has been called by many the "Missing Link."

It is not difficult to picture what this ancestor of man looked like. He was short in stature and very powerfully built. His skull was long and narrow, and he had a low receding forehead and heavy overhanging brows. The nose was flat like that of an ape and his nostrils were large. His jaw was heavy, but his chin was small and retreating. The canine

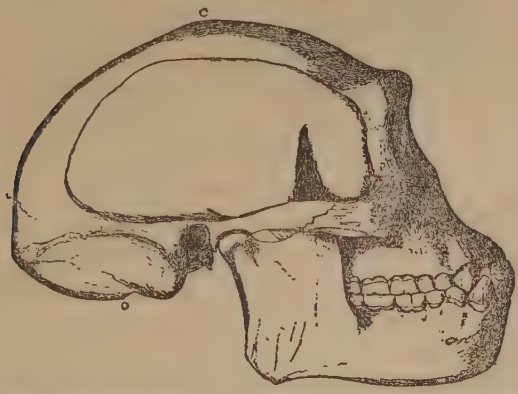


FIG. 22.—RESTORATION OF SKULL OF PITHECANTHROPUS ERECTUS

(After Dubois. Courtesy Smithsonian Institution)

teeth were like the fangs of an animal. The thigh bones were somewhat curved and he walked with a shambling gait. Mentally he was a child, but physically he had the strength and passions of a man. His feelings were rarely under control. He lived only for the moment, and in all probability knew

little or nothing of any of the arts. His senses were keenly developed, and his skill enabled him to hit a bird on the wing with a stone. His life was a wandering one; he moved rapidly from place to place seeking food for himself and his mate.

In the year 1907 there was found in a sand bank, sixty-nine feet from the summit of the deposit, outside the city of Heidelberg, a lower jaw belonging to an individual so low in the scale of development that we can almost class him with the Pithecanthropus. He has been called the Heidelberg man, and his discovery is considered one of the most valuable in the whole of anthropological science. The shape of his jaw is very different from that of modern man, for it is wide, low, massive; it lacks a chin, and if it were not for the teeth, which are distinctly human, it might well be classed as that of an ape. These teeth are small for the jaw, and if they were not well worn down, showing that they belonged to an adult, they might have belonged to a boy of fourteen.

The Heidelberg man represents a type a little higher in the scale than that of the Pithecanthropus, but it is still so low that we can class it somewhere between the apes and modern man.

There seems to be some doubt as to whether this man was a product of the first or of the second interglacial period. In the same deposit with him were found the remains of an elephant that closely resembled the African type, a rhinoceros, a lion, and many other species long since gone from Europe.

It is a little difficult to tell which individual stands next in the scale, but in all probability he who was found in 1911 in the south of England at a place called Piltdown can have that honor. As in the case of the other two, only portions of the man were

discovered, but by piecing these together a complete picture has been obtained.

The story of the discovery is interesting. Mr. Charles Dawson, a gentleman much interested in antiquities, noticed that a certain road near his home had been mended with pieces of flint different from any that he had ever seen in that vicinity. He

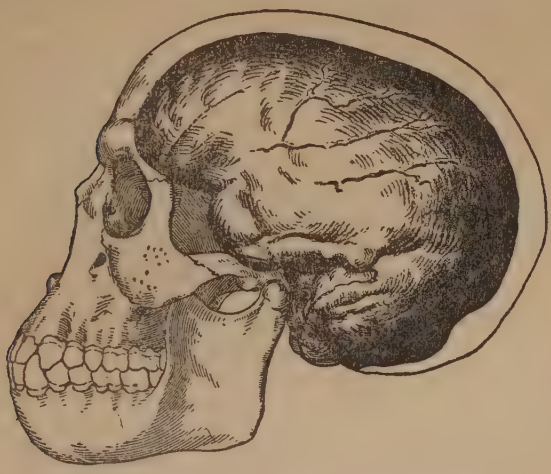


FIG. 23.—SKULL AND BRAIN OF PILTDOWN MAN RESTORED

(After McGregor. Courtesy American Museum of Natural History)

made inquiries and found that they came from a pit near Piltdown Common. On one of his visits to this pit a workman handed him a piece of very thick skull bone. Subsequent search revealed several more pieces of skull, part of the jawbone, containing two teeth, and one canine tooth. This latter was larger than any human canine tooth that has ever been discovered.

In all probability the Heidelberg and Piltdown races belonged to the same geologic age. They were,

however, in many respects so different that they must have belonged to separate races. The Piltdown skull was more like those of our very early

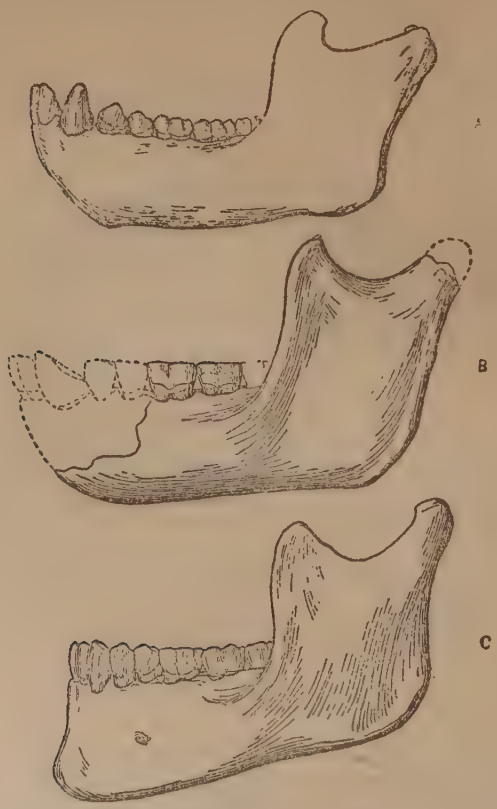


FIG. 24.—(B) THE MANDIBLE OF THE PILTDOWN MAN (RESTORED) COMPARED WITH THAT OF MAN (C) AND YOUNG CHIMPANZEE (A)

(After A. Smith Woodward)

ancestors than any that has yet been found. Although the cranium was undoubtedly human, its

cubic capacity was only about four-fifths that of the average European to-day, but twice that of the highest ape. The jaw was very similar to that of the Heidelberg man, although somewhat less massive, but the chin was even more receding than the Heidelberg chin. From all this we are led to one conclusion: that in the early Quaternary period the differentiation between races had pro-

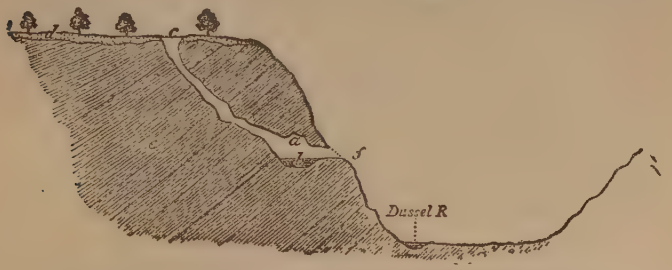


FIG. 25.—SECTION OF NEANDERTHAL CAVE NEAR DUSSELDORF, GERMANY

(*a*) Cavern 60 feet above Dussel River; (*b*) loam covering bottom of cave where skeleton was found; (*c*) opening from surface; (*d*) sandy loam; (*e*) Devonian limestone; (*f*) ledge of rock. (Hrdlicka. Courtesy Smithsonian Institution.) (After Lytell.)

gressed further than we had supposed, and that we will have to go a greater distance into the past in order to find the parting of the ways between the ancestor of man and that of his nearest kin among the apes.

It is not surprising that so few remains of the early ancestors of man should have come to light. This may be accounted for in a variety of ways. Possibly the dead were thrown to the wild beasts, as is the custom among certain savage peoples to-day. If they were buried by the rivers or near the surface of the ground, the skeletons would be washed away or disintegrated by the dampness. If

the bodies were eaten by members of the group and the bones thrown out on the ground, they would of necessity have disappeared long before this. It is only by the merest chance that we have found any at all.

When we get down to what is known as the Neanderthal period we find that conditions were

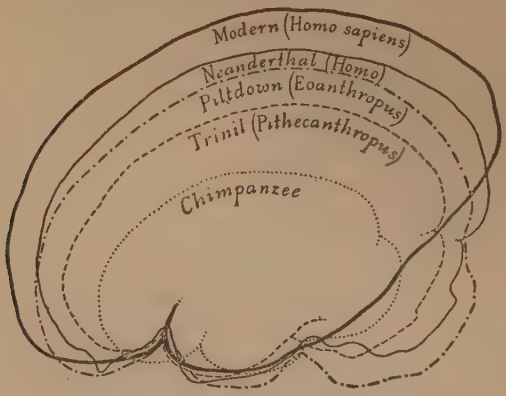


FIG. 26.—BRAIN OUTLINES COMPARED

Comparative outlines of brains of chimpanzee, Pithecanthropic man, Piltdown man, Neanderthal man, and modern man. (Courtesy of American Museum of Natural History.)

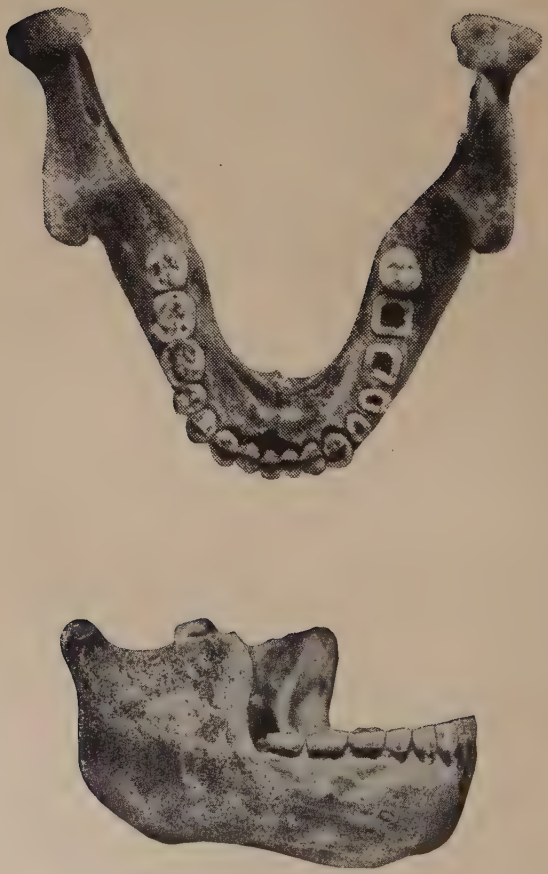
very much changed. More care was taken of the bodies of the dead, and they were placed in caves where the action of the elements is at a minimum. It is not necessary to mention the numerous human remains of this period that have been found all over Europe, from Gibraltar to Austria. They differ somewhat from each other, of course, but there is enough similarity to prove that they all belonged to the same race and all lived in the same geologic period. This race followed the Heidelberg race; in fact, the latter was the Neanderthal in the making.

JOHN DANIELS, "EDUCATED GORILLA"

American Museum of Natural History

PITHECANTHROPUS ERECTUS

(Restoration by McGregor)



VIEWS OF THE MAUER LOWER JAW
(Smithsonian Report. After Schoetensack)

It had a good many of the same characteristics, but it was more primitive, more powerful, and more apelike. Professor Osborn has summarized the characteristics of these Neanderthal people as follows: "An enormous head placed upon a short and thick trunk, with limbs very short and thickset, and very robust; the shoulders broad and stooping, with the head and neck habitually bent forward into the same curvature as the back; the arms relatively short as compared with the legs; the lower leg, as compared with the upper leg, shorter than in any of the existing races of men; the knee habitually bent forward without the power of straightening the joint or of standing fully erect; the hands extremely large and without the delicate play between the thumb and fingers characteristic

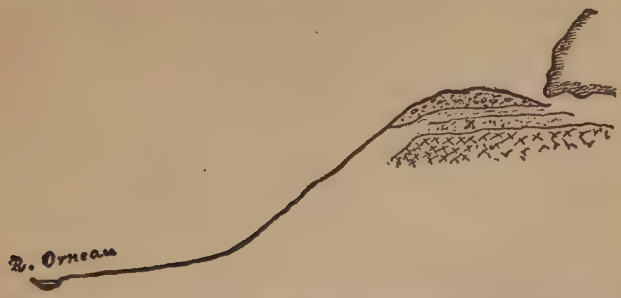


FIG. 27.—CAVE AT SPY, BELGIUM, WHERE TWO SKELETONS WERE FOUND

(After Fraipont and Lohest. Courtesy Smithsonian Institution)

of modern races; the resort to a squatting position while occupied in flint making and other industries . . . the heavy head, the enormous development of the face, and the backward position of the foramen magnum, through which the spinal cord connects with the brain, would tend to throw the upper part

of the body forward, and this tendency, with the lesser curvature of the neck, the heavy shoulders, and the flattened form of the head, would give this portion of the body a more or less anthropoid aspect."

Slowly the years and the ages passed, and with this movement of time man was not remaining stationary. Races came, occupied the land and grad-

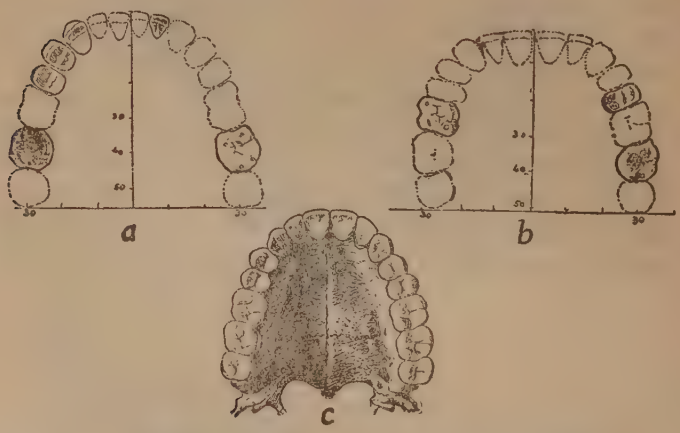


FIG. 28.—TEETH AND RECONSTRUCTED ALVEOLAR ARCHES OF PROBABLE EARLY NEANDERTHAL MAN, REMAINS FOUND AT LA COTTE POINT, ISLE OF JERSEY

(*a*) Lower arch (After Keith); (*b*) upper arch (After Keith); (*c*) modern dental arch (After Cunningham). (Hrdlicka. Courtesy Smithsonian Institution.)

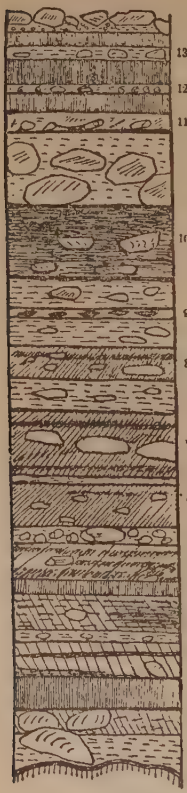
ually departed, leaving us no word as to how or where they went. We are, therefore, free to conjecture as to some of the reasons for their extinction. In the first place it must be remembered that at no time in this early age was the population very dense. Their method of getting food was such that each person needed many square miles of territory for hunting. We might assume that possibly they

were driven out and killed by the wild animals of their particular period. This is not very likely, especially after man reached the stage of weapons. Disease and epidemics of one sort or another may have carried large numbers of them away. As we saw in the last chapter, the climatic changes were taking place, so that those who, not understanding these new conditions, remained in their environment, were killed by the severe climate. Possibly in the case of a good many the process of evolution was slowly working, so that the lower types were little by little changed into the higher. But this process took many ages for its accomplishment.

We know that the Neanderthal peoples disappeared upon the arrival of the next and last group, which we shall discuss here, the Crô-Magnons. Whether this superior race which appeared in Europe drove the inferior out by death or banishment, or whether the latter were so weakened by the climatic changes that they went of their own accord, we shall probably never know. It may have happened that the Crô-Magnons killed all the men and possessed themselves of the women, but if this were so we should probably find some evidence of race mixture, or the skeletons of the high and the low types in the same graves. Nothing like this, up to the present time, has been discovered.

The Crô-Magnons probably came into Europe from Asia after the last, or fourth, glacial period, some 25,000 years ago, and from their remains it is evident that they were not related to the Neanderthals in any way whatsoever. If we look at the model of one of these men, we shall see at once that the type is more advanced than anything we

have had to deal with so far. The forehead is higher, the face less protruding, and the whole expression shows a very much greater brain power. In fact, in many ways these men were the superiors of some



13. Eneolithic Age. Small triangular dagger in copper.
12. Azilian. Flint objects. Age of the stag.
11. Upper Magdalenian. (Crô-Magnon). Artistic engraving on stag horn.
10. Lower Magdalenian. Flints and fine engravings on bone.
9. Archaic Solutrian. Laurel leaves, retouched on one side only.
8, 7, 6. Upper Aurignacian in three layers. Remains of the reindeer and engraving implements.
5. Lower Aurignacian. Stone and bone implements. Remains of an infant.
4. Upper Mousterian. Small implements and large tools of quartzite. Merck's rhinoceros.
3. Typical Mousterian flints and quartzites. Merck's rhinoceros.
2. Early Mousterian industry. Bones of cave bear and Merck's rhinoceros.
1. Acheulean flints.

FIG. 29.—STRATA AT THE GROTTO OF CASTILLO, PUENTE VIESGES, SPAIN

(Obermaier. Courtesy American Museum of Natural History)

of the savage peoples of to-day. It is obvious that their brain was well developed so that they had a high power of reasoning. "After a prolonged

study of the works of the Crô-Magnons one cannot avoid the conclusion that their capacity was nearly, if not quite, as high as our own; that they were capable of advanced education; that they had a

FIG. 30.—SECTION OF CRO-MAGNON ROCK SHELTER AT LES EYZIES, FRANCE

(*A, C, E, K*) Limestone debris; (*B, D, F, H*) ashes, etc.; (*G*) red earth, bones, etc.; (*I*) yellowish earth, bones, etc.; (*J*) earth; (*L*) rubbish of talus; (*N*) crack in roof; (*P*) hard limestone; (*Y*) position of pillar to support roof; (*a*) elephant's tusk; (*b*) bones of old man; (*c*) block of gneiss; (*d*) human bones; (*e*) slab of stone fallen from roof. (After L. Lartet. American Museum of Natural History.)

strongly developed æsthetic as well as a religious sense; that their society was quite highly differentiated along the lines of talent for work of different kinds." In the latter part of this chapter we will discuss their highly developed stone tools and weapons and the clever sculptures and paintings which they have left for us on the walls and ceilings of the caves of France and Spain.

The name of Crô-Magnons was applied to this race because there were found in 1868 at a little town of this name in France five skeletons. The type, however, was widespread and remains have come to light from Wales to Syria, including France, Spain, and Austria. Most of the finds have been taken from graves. In many cases the bodies had been carefully interred and with them were beads and implements of different sorts, showing that the people were religious and believed in a life after death.

When the Crô-Magnon race entered Europe the climate was changing, after the retreat of the ice, so that the summers were warm, or at least temperate, while the winters were very cold. There were still great ice caps left over Scandinavia and in the Alps, but the lower parts of glaciers did not reach the plains.

Before going on to a description of the tools and weapons made by these different types which we have been discussing, it is important that we bear in mind in what part of the Ice Age each appeared; hence the following summary is added:

Postglacial—Crô-Magnon.
IV. Glacial—Neanderthal.
3d Interglacial—Piltdown.
III. Glacial—
2d Interglacial—Heidelberg.
II. Glacial—
1st Interglacial—Pithecanthropus.
I. Glacial—

In the development of the stone implements used by man we find, after careful study, that the law of evolution applies. There is an ascending series of tools and weapons, going from those that show the

barest trace of human use and workmanship down to the most beautifully polished that it is humanly possible to turn out. In order to make the classification more exact, the whole period has been divided into three main parts, and under these are numerous subheads. They are called the Eolithic, the Paleolithic, and the Neolithic. An eolith is a stone that shows by its marks that it has been used by man, or that he has put a very little work on it to make it of greater use. The word paleolithic means old or rough stone, and is applied to those implements that have obviously been made by man, but which remain unpolished. The last is the neolithic, that is the new or polished stone, and is the term applied to the highest form of stone workmanship that we find among the primitive and savage peoples.

The greatest fight among the scientists has raged around the first kind, or the eolithic. Only within a very few years have they been generally accepted as having been made or used by man, and there are still some who maintain that they are only the work of nature. This is one of the most difficult of problems to deal with, as nature has fashioned so many stones which in themselves seem to be shaped by human art that often it is hard to distinguish.

There is a stone known as the Southern Cross, which is so beautifully cut that it seems as though the work must have been done by man, yet it is a natural crystal taken from the rock.

There are many kinds of rocks, such as flint, that will flake along very definite lines when hit at certain spots. It makes little difference whether the blow is struck by man or by another rock falling from a cliff, the result will be the same. Nature has various ways of working to produce this kind of result.

Rivers may wash stones upon stones and thus wear them down or break them; a movement of the crust of the earth will split rocks; a sudden change from heat to cold will tear rocks asunder. When a person finds a single flint flake, there is frequently no way of telling whether it was formed by man or nature. If, however, he should find a pile of them in a cave, or a large number of them buried together in the ground, it is fairly good evidence that human agency has been at work. This is especially true if they are all about the same size and shape. Of course there is a remote possibility that nature by some hook or crook could have formed and deposited them there, but just how it is difficult to figure.

The evidence of human workmanship is as conclusive as anything could be when we find stones of the same character and in the same kind of places, in numerous parts of Europe. It is on this combined basis that the scientists have been willing to accept the Eolithic period as the first in man's civilized history.

How man came to use stones for cutting we do not know. Some one has suggested that he may have stepped on a sharp flint flake and so lacerated his foot that he had forcibly brought to his mind the fact that he had found an implement for use on the animals. Most of the eoliths show little evidence of human workmanship, but they do exhibit proof of use. This is probably due to the fact that man did not know how to obtain pieces of the original rock, and so looked around until he found one that suited his purpose. Having dulled the edge or broken the point he searched for another of about the same size and shape, thus making a large collection of these in one place. Possibly after a time he learned to

take a flake that almost suited his purpose, but which had a small projection that hurt his hand, and fashion this to his use by a few well-aimed blows. In nearly all cases these stones have one side that was probably used for grasping in the hand, and another which was either sharp for cutting or dull for pounding.

As man continued to use these implements more and more, the natural supply began to run low, but by that time he had learned how to make them so that they would better suit his purpose. When he had begun to do that he had entered upon the Paleolithic stage. This period of man's development is divided into six subheads that are based on the more or less distinct forms of implements that went to make up the evolutionary series. These names are based on localities where large numbers of the stones have been found, and are as follows, starting from the lowest: Chellean, Acheulean, Mousterian, Aurignacian, Solutrian, Magdalenian. Before taking up a discussion of the main features of the tools and weapons of each of these stages, it is necessary to look at the methods employed by primitive man in their manufacture. One of the first things necessary for him to learn was that flint, when struck at a certain point in a certain way, would always fracture along definite lines. It was not always necessary to hit it, for when pressure was applied by means of a piece of wood or bone, a flake of a recognized shape and size would come off. Of course it took him a very long time to learn all these details, and it was not until the end of the Stone Age that he approached perfection. In the beginning, however, he learned by many trials and failures some of the fundamental

laws of stone fracture. When he wanted a sharp, cutting tool he would take a large piece of flint, pry off a long flake, and then, by taking off a corner here and an edge there, fit it to suit his hand. Or if he desired a hammer or an ax, he would start with a larger piece, and by knocking or prying off little pieces would ultimately get it as he wished it. The work at first was, of course, crude, but each succeeding age gave him greater skill until he was at last able to turn out a beautiful piece of craftsmanship.

This process all sounds very simple, but it is really most difficult. Modern scientists have tried to make some of these tools and weapons, using the same means employed by the primitive men, and, after working for a long time, they turned out a product that early man would have been ashamed to acknowledge as his.

Most of these stages in the development of stone tools can be found in various parts of the world, and can be accounted for by the fact that at this period human needs were about the same, rather than by supposing that this art originated in one place and travelled over the world in ever-increasing waves.

Were we making a detailed study of these implements it would be necessary to take up the various forms of the different periods, but, as we are not, a few words in regard to each will be sufficient.

Chellean—The implement that is distinctive of this period is in shape like the form of the two hands placed palm to palm. It was used without a shaft, probably for pounding, and in order to make it fit the hand a flake was struck off from one side. Other tools were side and end scrapers used in pre-

paring skins; sharp boring tools, and other similar instruments. The Piltdown man used these.

Acheulean.—The almond-shaped implements were much developed, being fashioned into dagger or lance forms with all the edges carefully chipped.

FIG. 31.—A FINE EXAMPLE OF ACHEULEAN FLAKING

(Courtesy American Museum of Natural History)

Sharp knives were formed for cutting up the animals killed in the chase. The sharp spearheads were probably fastened to shafts. The Neanderthal race used these.

Mousterian—The implements of this period were characterized by being pointed, having sharp edges, rounded sides, but flat ends so that they could be held in the hand. Most of the stones were used as scrapers for skins. The almond-shaped stones that appeared in the Chellean and were developed in the Acheulean scarcely appear at all. "The history of this implement . . . presents a most interesting

analogy with the course of evolution observed in so many animal and plant forms. It passes through many stages of improvement and reaches a climax of perfection and adaptation; it then comes into competition with another form evolving on a funda-

FIG. 32.—REMAINS FROM CZECHOSLOVAKIA

Upper sketches, Paleolithic implements, possibly dating from about 15,000 B. C., together with part of a skull found in Czechoslovakia. Lower sketches, skull and metal articles from Czechoslovakia, probably remains of a Slav people that entered the territory about 2000 B. C. (Courtesy Smithsonian Institution.)

mentally different and superior plan and disappears in the struggle for existence through the greater usefulness of the replacing type." These were probably used by the Neanderthal race.

Aurignacian—For the first time we find stone arrow and spear points giving way to those of bone. Most of the stone scrapers have a notch in the side. Many of the tools were designed for the purpose of carving in the rock, for, as we shall see later, the art of painting and sculpture probably began in

this epoch. The Crô-Magnon race made these and the implements in the following two periods.

Solutrian—In this stage the flint was taken from the core by pressure, in fine, thin flakes. These are called laurel-leaf points because of this shape, beautifully symmetrical, and carefully fashioned. This industry was especially developed in Hungary and later spread into western Europe. One thing that characterizes the implements of this period is a long stem on one side that was probably used in fastening the point to a shaft.

Magdalenian—Here we find the bone industry progressing to the place where the people were making barbed harpoons, javelins and needles. The stone tools were usually small and were employed exclusively in carrying out artistic work.

Although we call this period one of the stone ages, most of the advance was made in the manufacturing of implements of bone and ivory. There were, of course, many stone tools, but few of them show the introduction of any new ideas.

This brings us to the end of the Paleolithic or Old Stone Age. From here we move into the Neolithic or New Stone Age, where the implements show a higher technique. It does not mean, of necessity, that all of these were polished, for they were not, but they were so finely chipped that they belonged, obviously, to more advanced races. In the process of manufacture the workmen would chip them down as finely as possible, and then, with the aid of sand and water, would polish them until they were very smooth. The axes and hatchets resembled the modern ones of steel copied from them. For the first time the stone was bored to permit the introduction of a handle. This process of penetrat-

ing through a thick stone was very slow, but men of this age were possessed of unlimited time and endless patience. Some of the best specimens of this Neolithic period are pictured in this volume.

We cannot leave our discussion of the old cave men without saying something of their art, for in

FIG. 33.—CAVE BEAR

Outline engraving in a cave at Combarelles. (After Breuil)

this they showed a development that has scarcely been equaled among any of the historic savage peoples. During the early history of the race there is no evidence that the people had developed the ability to draw or paint, but with the dawn of the Crô-Magnon things changed. There slowly came into the mind—from whence we know not—the first germ of art. Crude and uncertain at first their pictures were, like the drawings of children, but as skill and confidence increased, they were broadened in scope, developed, became perfected, until at the end these primitive men were doing work that would bring credit to many a modern artist. This was not an ability that was passed on from race to race, but an inborn quality that seemed to come to

all of them at about the same time. From all over Europe we find the evidence on the walls, floors, and ceilings of the cave homes, and it is reasonable to suppose that the groups in the north knew little or nothing of their brothers in the south. These people have been called the Greeks of the Stone Age, for the same sense of beauty, the same ideas of symmetry, showing keen observation, which impelled the classical people to develop an age-lasting art, caused these earlier and cruder men to leave for us a picture of the animal world with which they were surrounded.

Their first efforts were put on the decoration of their stone and bone implements, but the work was crude, with little artistic merit. But it was the beginning; it was the one-cell stage in the evolution of art. The next attempts we find in the caves where, like children, they drew or scratched on the walls the things that they had seen. This carries each one of us back to his own childhood, when with

FIG. 34.—SCULPTURE IN BAS-RELIEF ON A TRUNCHEON FROM BRUMQUEL, FRANCE

a pencil and paper he drew the crude outlines of a horse without any idea of proportion, with a head too small and a body too big. The legs of the animals, as drawn by the prehistoric peoples, were represented by two lines, but there was only one

leg in front and one behind, for the picture was in absolute profile. Where color was used, it was only to outline the animal, for the idea of shading or solid color had not, as yet, dawned.

In all of this study of early art we are struck by several important facts. The men drew entirely from memory without the model present, for many of the decorated walls are far back in the inner re-

FIG. 35.—SMALL HORSE PAINTED ON WALL OF CAVERN OF CASTILLO, SPAIN

(After Breuil)

cesses of the caves. This, of course, meant that the people not only studied the animals of the chase very carefully, but that they noted and remembered their shape, size, color, and even their exact movements. One evidence that they were trying to depict the things which they saw, and not always the things as they knew them to be, is found in the drawing of the legs of a good many of the animals. Instead of placing feet on all of them they would terminate the legs at the end of the straight lines. This was probably done because the man knew that when the feet were hidden in the grass they could not be seen,

and he wanted to make his drawing as true as possible.

The observer is impressed by several important things. The first is the great amount of realism that is put into the figures by very few lines, and the second is that frequently, when they desire to indicate the fact that the animal is running, they will give him four forefeet. Let the reader notice carefully the next animal that he sees running very fast and he will see that the legs move so rapidly that the animal seems to have more than the allotted number. This was what the old cave men were trying to portray.

As art developed, the animals were given four instead of two legs and the idea of perspective was so far advanced that they did not appear to be all on the same side of the body. In painting the ancient artists began to do more than use color in the outlines, for they applied it to the body of the picture with the idea of shading. They were, however, using only one color at this time. Where color was not used, hair was indicated by a series of very fine lines that gave a most realistic effect.

The last stage in their painting was reached when they not only had the perfect details of the outlines, but also colored and shaded the entire beast. In doing this they used black, brown, red, and yellow. So perfectly were their colors mixed and applied that they stand out to-day as vividly as when they were put on.

In making their colors, ocher and oxide of manganese were ground to a fine powder in stone mortars. These were carried in the hollow leg bones of the reindeer. When the raw pigment was to be

used it was mixed with animal fats on the flat shoulder blade of the reindeer as a palette.

There are a few unexplainable things in the art of these Crô-Magnon peoples. In all of their drawings very few human beings appear, and of the ani-

FIG. 36.—POLYCHROME PAINTINGS ON THE CEILING OF THE CAVE AT ALTAMIRA (SPAIN) REPRESENTING BISON, HORSES, DEER AND WILD BOAR

mals the bison, the reindeer, and the horse are the most common. Can it have been that a religious prejudice prevented the copying of the human form or were they unable to depict it? This latter seems unlikely, for they were so skillful with the animals that the drawing of the human form should not have been an impossible task. As many of the animal representations are carved into the rock, if they had attempted the human form and failed, we probably should find evidence of it to-day.

Another thing hard to explain is that there is practically no unity of grouping of the animals. In one picture, for instance, there are a large number of horses, bison, deer, boars, but they are indiscriminately mixed, some being upside down, while others are put in sideways. Often on the same wall there will be the pictures of many animals, some finished, others half finished, and even superimposed

on each other. In some instances many years must have elapsed between the different drawings, so that the conclusion is that they needed space, and the fact that an animal was already drawn did not in any way deter the later man from putting another one on the same spot.

The question naturally presents itself as to what motive or motives caused these men to decorate the walls of the caves with the pictures of the animals which they knew. It may have been that the artistic impulse had to have an outlet and, therefore, they took the nearest place at hand for this self-expression. It would seem logical that they should use the walls near the entrance. In many instances, however, far distant chambers that were most difficult of access were used. As all the work had to be done by the light of small stone lamps with float-

FIG. 37.—SUPERIMPOSED DRAWINGS

Drawings from a cavern at Font-de-Gaume, Dordogne, France. (American Museum of Natural History.)

ing wicks, it seems strange that they did not try the place where they could have utilized daylight. It has been suggested that these drawings had to do in some way with their religion, but Professor Osborn says in regard to this idea: "If it were due to a feeling partly religious which regarded the caverns

with special awe, why do we find equally skillful and conscientious work on all the mobile utensils of daily life and of the chase, apart from the caverns? The superposition of one drawing upon another, which is especially characteristic of this cavern (Font-de-Gaume) does not seem to strengthen the religious interpretation.

"There is no evidence that numbers of people entered these caverns. If this had been the case,

FIG. 38.—SUPERIMPOSED PAINTINGS—HORSE AND COLT

From the cave at Altamira, Spain. (American Museum of Natural History.)

there would be many more examples of inartistic work upon the walls. It is possible that the Crô-Magnon artists constituted a recognized class especially gifted by nature, quite distinct from the magician class or the artisan class. The dark recesses of the caverns opening back of the grottoes may have been held in awe as mysterious abodes. In line with this theory is the suggestion that the artists may have been invited into the caverns by the priests or medicine men to decorate the walls with the animals of the chase."

The art of these people was not confined entirely to painting, for they knew something of sculpture. In many caves the animals are carved in bas-relief on the walls, and human beings play some part. The work is very much cruder than the painting, even at the end of the period, and a great deal of it would bring joy to the heart of the modern cubist

FIG. 39.—BAS-RELIEF OF A WOMAN WITH A DRINKING HORN SCULPTURED ON FACE OF A BOWLDER WITHIN THE SHELTER OF LAUSSEL, SOUTHWEST FRANCE

(Attributed to the late Aurignacian period)

"artist." In one cave is the nude figure of a woman holding a bison horn in the right hand. The figure is polished and shows evidence of having had on it at one time red coloring. Near this is the nude figure of a man in the act of throwing a spear. There have been found in this cave numerous flint utensils used for cutting stone and they resemble in many

respects those used in the studios of to-day. The commonest carvings are found on pieces of bone and stone where, for instance, the handle of a dagger would be shaped into some animal form. Small statues have even been found in which the cubist art was not at its beginning, but at its height. It is interesting to note that most of the figures were very fat females (rather than males), a fact which

FIG. 40.—FOUR-COLOR PAINTING

Picture of a bison from the cavern ceiling at Altamira, Spain

gives us some idea as to their conception of feminine beauty. Where the man does appear he is invariably thin.

While decorating the caves, the Crô-Magnon artist was quick to take advantage of any projection of rock that could, with the aid of a chisel and paint, be made to assume the form of an animal's body, or even part of the body. Some of the cleverest things done at this early period had their origin in some natural protuberance of rock.

Toward the end of the Magdalenian period the people began to model in clay. These remains are not common, but several have been found. Among the best are two from a cave in the Pyrenees. Far

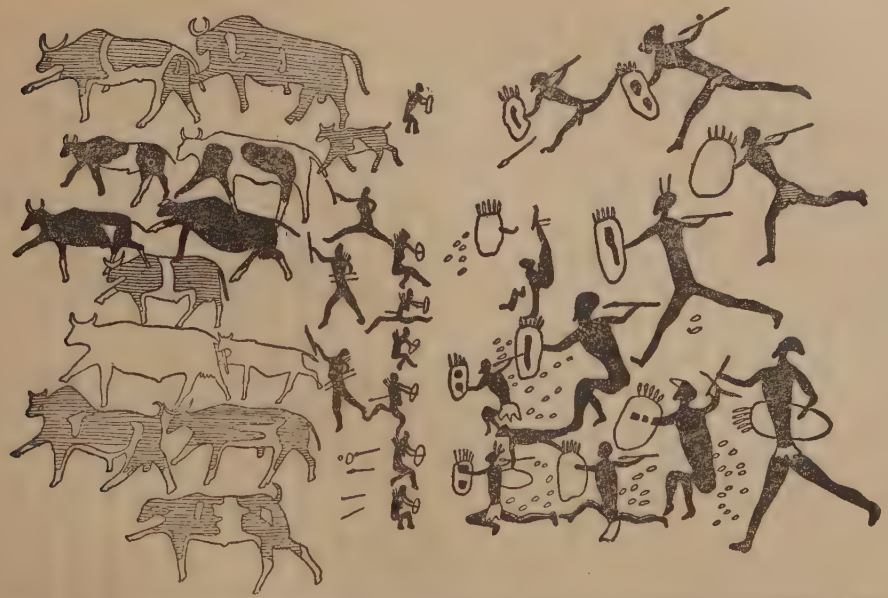


FIG. 41.—BUSHMAN PAINTING, REPRESENTING BATTLE BETWEEN BUSHMEN AND BECHUANAS OVER STOLEN CATTLE

(After R. Andree)

back in an inner chamber, the entrance of which was almost closed with stalactites, there were found two beautifully made statuettes representing bison. Near these was one half-finished with the lumps of clay bearing the imprints of the fingers of the artist lying there, and scattered around lay the tools used in the work. It is interesting to think of the ages that have elapsed between the time when something or some one summoned that sculptor from his unfinished work and the day in 1912 when scientists, seeking the threads in the story of the civilization of that man, broke the door of stalagmite that had sealed the chamber, and entered. Ten, twenty, thirty thousand years may have passed between the departure of the old and the arrival of the new.

We cannot close this chapter without a word of comparison between these Crô-Magnon artists and their closest followers in the savage world to-day—the Bushmen of South Africa. These people are in the Aurignacian stage of culture and their painted walls and carved implements closely parallel those of the earlier people. There seem to be two main distinctions between their works of art. In the Bushman paintings whole scenes are represented, such as a hunting expedition, where not only the animals are depicted, but also the men and their methods of attack. Another picture shows the result of a cattle raid into the Kafir territory. The Bushmen are driving the animals in front of them and at the same time are fighting off the owners of the cattle who would take them back. Other pictures represent tribal dances in which both men and women are taking part. It will be remembered that in the case of the Crô-Magnons there were very few groups in action, for most of the animals were not

drawn with the idea of telling a story or recording history. The Bushmen do not hesitate to draw the human figure, although they make their sketches rather for the purpose of conveying an idea than for that of giving a true picture of the individual.

The resemblance between the pictures of these modern savages and those of the prehistoric Crô-Magnons goes to prove beyond a doubt that the artistic impulse finds expression in man at a very early stage—almost in the dawn of civilization.

CHAPTER VII

THE INFLUENCE OF ENVIRONMENT ON CIVILIZATION

THE influence of geographic environment on the history of civilization has been more far-reaching than the average person realizes. Human groups have, since the beginning, been surrounded by such natural features as oceans, rivers, plains, deserts, hills, mountains, and lakes. These have all been taken as a matter of course, and the people have little known that their entire type of civilization has been largely dependent upon them. And it is not only these tangible things which have advanced or retarded the progress of the world, but climatic conditions also have played a great part in the molding of human destinies.

People living in the heat of the tropics become listless, with little ambition, while those in the temperate region are energetic, for their whole livelihood depends upon the amount of labor expended. The isolated mountain valleys cause a people to be self-contained and sufficient unto themselves in every way, while those in the broad river valleys need the products of the whole world for their enjoyment. And so it is that each river, lake, mountain has had an untold influence in determining the lives of those people who have lived near it. How important these influences have been we cannot tell

until we have looked into them in detail, and so we shall take up various environmental influences and see what part they have played in advancing or retarding civilization.

No great world culture ever developed either in the tropics or the frozen north. If we go far back in history, we shall see that the civilizations of Egypt, Greece, Rome, along the valleys of the Chinese rivers, on the Tigris and Euphrates, originated either in the temperate or the subtemperate zones. Even the great culture of the Aztecs in Mexico and the Incas in Peru was born on such high plateaus that the climate was temperate. An apparent contradiction to this is India, which is partially tropical, but here the people who started the civilization came from the cooler regions of the north, and ever since new blood has come in to revitalize it. Although the development of all culture took place originally in the warmer parts of the temperate zone, yet those who introduced it came from the northern part.

There must be some very definite reasons for this state of affairs. A moment's thought will show why no very great height of culture has ever been reached in the frozen parts of the earth. There the Eskimos are living in one of the most difficult environments in the world, surrounded, for most of the year, by ice and snow. If conditions are favorable, that is, if there is good hunting, and if they put forth a great amount of energy, they are able to get enough on which to live. It is almost a hand-to-mouth existence, and hence it is impossible to store up those things for the future that are necessary for the development of a higher civilization. All the time they are living on the very edge of subsistence, so that if any one thing goes wrong, such as the loss of a

weapon, the destruction of a boat, or the nonappearance of the seal or bear, their life is pretty nearly terminated. Hence, no matter how much energy they put forth, they can never advance very far up the cultural scale.

In the tropics just the opposite conditions prevail. Life is too easy. There is no stimulus to cause a

FIG 42.—BREADFRUIT
(*a*) pod; (*b*) fruit

man to put forth much energy, for nature is so lavish with her gifts that life can be maintained with little labor. Captain Cook tells of a Polynesian who, during his lifetime, planted two breadfruit trees, and who not only considered that he had done enough to support himself and his family, but felt that at his death he was leaving a rich heritage to his son. It is interesting to compare this individual with the man in the temperate zone who labors all

his life in order to leave even a small legacy to his family.

There are many types of fruit in the tropics that are supplied by nature without any human cultivation, and they are so arranged that they come to maturity during every month in the year. Such a tree as the date palm is said to have 360 uses, so that a man can not only feed himself and his family from a few of these, but he can also provide clothes and shelter.

On the Malay Peninsula, the island of Ceylon, the coast of southern India and most of the islands of the Pacific there grows the coco palm, the uses of which are as numerous as those of the date palm. The huge flower yields a juice that is fermented into a drink called arrack, which is the applejack of the tropics. The flower stalk, when dried, is made into torches, and the leafstalk into fences. The leaves can be used for thatch, and for umbrellas. When the nut is green it is eaten and its juice is drunk, and when ripe its shell yields a fiber that is woven into mats, ropes, and cordage. The inner hard shell furnishes cups, dippers, and other vessels. When the kernel is ripe it is dried and shipped to the markets of the world as copra, which is used in so many kinds of candy. The nuts also yield the valuable coconut oil from which candles, butter, and soap are made. A thousand nuts will produce five hundred pounds of copra, or twenty-five gallons of oil. It seems as though most of the wants of tropical man were provided for—at slight cost of labor—by this one tree.

The one thing that causes civilization to develop is labor, and the thing that causes labor to be expended is want. If wants can be satisfied without

labor, there is nothing to bring forth energy, and civilization will not develop. Tropical peoples that live in productive environments are satisfied with the food that they can collect, or, if they want more, very little energy will give it to them. They need few clothes and they are perfectly satisfied if they have a shelter that will keep out the rain and the blazing sun.

History shows us that people from the north who have gone south with the idea of developing the tropics have soon found that the climate was such that they could do very little manual labor themselves. Therefore, the only thing to do was to try to get the natives to work. This they did more or less willingly at first, in order to obtain the beads and mirrors and knives and bright colored fabrics. But it did not take them long to own as many of these as they could use, and they stopped working. Then the whites tried paying them in money, but this meant nothing to them, for it only purchased either the things that they had or the things that they did not want. Next slavery was attempted and this worked fairly well, for with overseers the people were compelled to labor. Laws were passed, however, that prevented this, and so, as a last resort, firearms and liquor were given to the natives in payment for labor. The whites soon found out that guns in the hands of the natives were not very safe and they were taken away. This left only liquor and opium. The natives were never given enough to satisfy them, and so at last commodities had been found for which they would put forth almost any energy. This constant application of "fire water" and "dope" resulted in a huge death rate, for strong alcohol and opium plus the heat of the tropics are

always fatal after a short time. Thus it is clear why no very high civilization has developed under the equator.

In the temperate region the climate calls forth energy and labor. There is always a reward for work done. Man has ever-increasing wants and he knows how to satisfy these. He does not live from hand to mouth, for he can raise vast crops in a few months to support him during the rest of the year. Since the beginning he has been laying up the results of experience, of trials and failures, until he has built up the great civilization that has spread into other parts of the world.

The statement that culture has developed in the temperate region does not mean that every part of this zone is equally favorable. There are many sections in which the physical environment is such that nothing ever has or will develop. For instance, in some places the mountains are too rugged and barren to permit the securing of even the slightest foothold; elsewhere the deserts are so lacking in water that human life cannot well be sustained. The most favorable locations are on the flat coasts and along the broad river valleys.

In order to reach any great cultural height two things, at least, are necessary; namely, large numbers of people living together and the ability of different groups to come into contact with each other. The environments mentioned above allow both of these conditions. Most of the old civilizations of the world occurred in places of one of these two kinds, and we have only to look at early Egypt, China, or Assyria to find the proof of this statement.

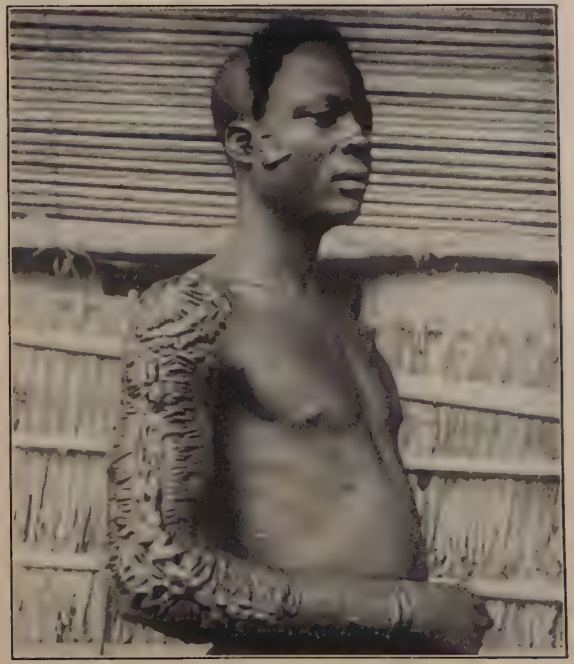
The principal factor that determines whether a people are to be settled or wandering is the ability

to make a living. When man depended upon the wild animals around him for food, he could have had no settled life, for the fortunes of the chase were so precarious that he had to move rapidly from place to place in order to get the wherewithal to live. When he began to supplement this wild food with his domestic animals, his existence became more settled. He was still, however, on what we might call the nomadic stage; that is, he was moving in search of new pasturage for his herds. This did not mean that he was constantly on the move, for he could stay for some time in one spot before the grass would all be consumed. When he began to get his living from agriculture, his life was more settled; and by the time he planted fruit trees and vines we may assume that he was located permanently in one spot. On each one of these stages of his development he found the broad plains, the river valleys, and the seacoasts most favorable, for they gave him a greater area over which to wander and a more fertile soil when he settled down.

No peoples who are constantly on the move can approach any great heights of civilization, for in order to reach this stage it is necessary for them to be in possession of many arts, of science, and of religion. The possessions of the wandering nomad consist of a tent or two, a few pots, pans, and kettles, and the necessary weapons and clothing. All of these can be carried on the backs of the animals when camp is shifted. But the agriculturist has his permanent house and all the necessary paraphernalia to run it. Towns and cities can grow up and with them all of the attributes of civilization.

On the former stages the population is, of necessity, small, but where the food supply increases a

NORTH AMERICAN INDIAN



AFRICAN NEGRO

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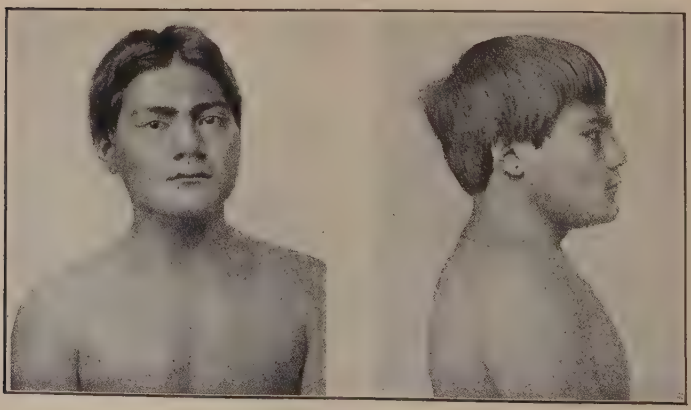
CHINESE MERCHANTS



POLYNESIAN

greater number of people can live together. This means that there will be more brains to devise new ideas and to develop old ones. A few people living together will never advance very far up the cultural ladder by themselves, for there is needed the contact with others in order that ideas may be exchanged.

In the broad river valleys the communication between different groups has always been easy. There are no obstacles such as one would encounter in the mountains. The water of the river is usually deep enough for navigation, and the roads and paths that are soon worn on the banks serve as easy routes for trade. Back and forth between the seacoast and the interior the people travel, carrying with them their ideas and products for trade. The fishing peoples by the sea will have developed different thoughts and methods of work from those inland engaged in agriculture, and the miners at the edge of the valley will have learned secrets from the interior of the earth which they are only too glad to whisper in exchange for thoughts from the sea. And so back and forth, up and down the coasts and valleys people have gone spreading their knowledge and their products, and in exchange receiving inspiration from the various types with whom they have come in contact.

But what a different story we have to tell of those small isolated groups that are living in the narrow mountain valleys cut off by the high ranges from all contact with the outside world. In a majority of instances they have been driven there by stronger peoples, for no conquering race would choose so unfavorable an environment for development. Many of the Indian tribes of this country were driven back

into the mountains by those who would take their hunting lands away from them. The early Welsh sought the protection of the highlands of Wales and have lived there to this day, even maintaining their language, their customs and, in places, the native dress. The Basques in the Pyrenees have so cut themselves off from the rest of the world that even their language does not seem to be related to any other spoken tongue.

It is not necessary to seek foreign lands in order to find the mountain peoples, for we have only to travel into the south of this country to see what complete isolation may do to a group. The so-called "poor whites" have been living so long away from the rest of the world that they stand as typical of a people of this type. Many years ago they chose the narrow mountain valleys instead of the plains for their home, and when they entered, they closed the door to all outside influences. They started as a sturdy stock, but they have so intermarried that they are now a degenerate people with no ambition and no morals. They get their food by cultivating a few small patches of soil on the mountain sides and by keeping a cow and a few chickens. The men roam the mountains in search of game while the women stay at home, tend the children, and look after the crude house. A man thinks nothing of living with two or three women, one of whom may be his legal wife. There seems to be peace and harmony in the family, since jealousy is not one of their faults. Their huts are usually of one room, and here live the men, the women, the children, and as many animals as can crowd in. The children have almost no education and practically no religious teaching. If there is a school in the neighborhood, which is

doubtful, there is a teacher there for only a short time every year, and if there is a church, the traveling preacher does not get there oftener than once a month. Sometimes years pass without any sort of communication with the outside world and it was only a short time ago that a traveler was asked by a native if the Civil War was over, and if so, who won. Surprising examples of ignorance were brought to light in the draft camps where these mountaineers were sent. Some of them did not know their right hand from their left, they had no idea where the sun rose or set; they did not know the name of the President of the United States, and one night, when one of our batteries was firing on the range they fled in disorder, for they thought the Germans were attacking the camp. When asked where they thought Germany was, they pointed down the road.

There are some mountain valleys, such as we find in Switzerland, Norway, China, and the Philippines, where this condition does not prevail, but this is largely due to the fact that they are open to communication with the outside world. Where the sides are too steep for cultivation they are terraced and a valuable crop, such as grapes, is grown there. If it does not seem practical to do this, and there is grass on the mountain sides, the cattle are sent there to graze or the hay is cut and carried down in the valley for winter use.

As the civilization of the world becomes more complicated, specialization increases to such a point that no one section of such a country as the United States can comfortably exist without the help of all other parts. The one thing that largely determines the type of industry that a people shall engage in, is

the geographic environment. New England tried, at one time, to become agricultural, but she found that her water power suited her more for manufacturing, and so she left the tillage of the soil to the more favorable sections of the country. The people living on the Atlantic coast began to devote their energies to fishing and to sea commerce. The Appalachian range was found to contain great deposits of coal and iron and so this region does much to supply the countries of the world with these raw products. Farther to the west are the great fertile plains and river valleys that surpass the rest of the world in the yield of their crops. Where the rainfall is less abundant, and tillage of the soil becomes more difficult, cattle are raised. For a long time the region between the two western mountain ranges was too dry for any habitation, but by irrigation the arid region has been made to yield almost unheard-of crops. On the far western coast we find the garden spot of America, where crops of all sorts grow in great abundance. In the early history of our country each one of these sections, if inhabited, was sufficient unto itself. But times have changed. The rivers and the lakes first formed means of communication between the different places, and then, with the harnessing of steam to serve man, the mountains were crossed, so that the east and the west, the north and south were joined by a vast network of railroads.

It makes little difference whether we are dealing with savage or with civilized peoples, the important part that environment plays is constantly before us. This point can be illustrated by taking a typical savage group, where the surroundings are so unfavorable that they dominate every movement in the

daily life of the people, and describing something of their culture. For this story we will choose the Bushmen of South Africa.

These little people live, or we should say lived, for most of them have been exterminated in one way or another, along the edges of and in the Kalahari desert; this is as barren a section of the world as one can well imagine, and no human group would have gone there except under compulsion. They were driven from the fertile lands by the strong native tribes and by the whites. This so embittered them that they were in the habit of retaliating by raiding the cattle in the surrounding lands. The result was almost constant fighting between the Bushmen on one hand and the Kafirs and whites on the other. It was little wonder that they felt that every man's hand was turned against them, but they certainly repaid their injuries to the best of their pugnacious ability.

The animals and plants in the desert were very scarce and water could be found only with difficulty. The physique of these people showed that they had been in contact with hunger and all kinds of privation for a long time. They were the shortest race of man, averaging only about four feet six inches. The build was slight and the limbs were lean and emaciated. Even the children lacked the roundness that characterizes those who are living under more favorable circumstances. The bodies of the older people had little fat and the skin was so dry and leathery that it seemed to fit the body too loosely. The desert had, however, strangely developed their ability to run and had made their senses very acute.

The Bushman was called the "unfortunate child of the moment" and the name aptly fitted him,

for he was forever living from hand to mouth with no thought of the morrow. The desert filled him with at least one ennobling quality, the love of freedom. He never came under the yoke of slavery, as have so many other African peoples, and when captured, preferred death if he could not escape.

Almost the entire life of these people was spent in the search for food and water. They became clever in finding things where no one else could. For instance, while on the march, they would come to what was apparently the dry bed of a brook. The women would dig down and then, putting reeds into the ground, would suck up the moisture, which they stored in ostrich eggshells for time of need. When they camped for any length of time they would bury these shells in the ground to keep the water cool. As beggars cannot be choosers, the Bushmen were not in any way particular as to what they ate. Anything that moved was considered a delicacy and so things such as insects, lice, worms, lizards, locusts, grasshoppers, frogs, and snakes held important places in their diet. The locusts were dried over a fire and then ground to a powder. A locust porridge was made by mixing this powder with honey. Possibly our stomachs revolt at the thought of this, but was it not John the Baptist who consumed locusts and wild honey in place of other food?

Their diet did not consist entirely of this smaller live stock, for when they could get cattle by their raids, or fall upon an ostrich, they gladly consumed these. Many times their keen wits saved them from starvation, especially in hunting the ostrich. They would cover themselves with the skin and stuffed head of one of these birds and then by whitening their legs they could get into a flock of them

unperceived. A small knife or a poisoned arrow would dispatch several before the rest took fright at this vicious flockmate.

For shelter they used caves, overhanging cliffs, or the deserted pit of the ant bear. They had progressed very far when they bent down a shrub and covered it with leaves and moss. One of their reasons for not making anything more substantial was the fear that their enemies might see them more easily. Another was the fact that they were obliged to move so rapidly in search of food that they could not stay for any length of time in one place.

The Bushmen lived in very small groups, for it took anywhere from 40 to 200 square miles to support one person. A man might have as many wives as he could support, but as a rule one was sufficient. There were very few children allowed to live, for each extra mouth to feed meant just that much less food for the rest of the people. All abnormal children were killed as soon as they were born, for no one could live who could not help the whole group in the struggle for existence. If a mother, who had young children, died, her infants were buried alive with her, for there was no one to look after them. Instances are known where children were thrown to hungry lions roaring outside the cave, for if they did not do this the older members of the community would probably have been killed. When a man or woman became too old to work they were put out on the desert with a little food and left there for the lions to accomplish their destiny.

From this brief description of these people it is obvious that their whole life was bound down by their difficult environment. There was no action which did not show its influence. The lower we go

in the scale of civilization the more do we see how intimately bound up with man's surroundings is his everyday life. As we go higher, while the environment still plays an important part, yet it is somewhat modified by the arts and sciences.

The statement has been made that environment is the dominant element in the history of races. How different, for instance, would have been the story of this country, if the early settlers had landed on the Pacific instead of on the Atlantic coast. The great mountains of the West would have proved almost insurmountable barriers to the people, and so they would have settled the coast thickly, but for a long time would not have penetrated beyond. The hills in the east are low, so that they could easily wander into the fertile Mississippi valley and there begin the farming settlements.

Because of the geographical situation of Africa it has long remained an unknown continent and it is very likely that it will remain so until the end of time. Across the north extends the great Sahara desert, which is almost impenetrable except to the wandering tribes; on the west is a coast that has few harbors, so that the large vessels must send their cargoes ashore in small native boats. The heart of Africa is a dense jungle that locks safely within its intertwined branches and trailers and underbrush its age-long secrets. Even when one tries to penetrate into the interior by river he is stopped before long by rapids that no boat can navigate. The east has some good harbors and the region back from the coast is being developed by the railroad extending from the Cape to Cairo. But even here the interior stays closed to all but a few of the more daring hunters and traders.

There extend across the north of India the lofty Himalayas, which are so high that if the Pyrenees were piled on the Alps these mountains would tower 4,000 feet above such a combination. The whole history of India has been bound up with these great heights through which there are only a few difficult passes. The fertile valleys of the Indus and the Ganges would have tempted many more barbaric hordes than really reached there, had they been able to find more easy access, but it took only a handful of men to defend these passes against the invaders.

If we turn to the islands of the world we find that there, too, the history and the civilization of the inhabitants are closely bound up with the environment. As a rule, the climate is more stable, with fewer changes than are found on the continents. England owes much of her power to her island position, for the channel has left her independent of Europe, yet able to make full use of it. This water has warded off many of the plagues that have devastated neighboring countries and has helped her to fight off successfully many invaders that have sought to destroy her.

Some one has said that the geographic environment is the permanent element in the shifting fate of races. Let us take here and there from history examples to illustrate this point. "The upheaved mass of the Carpathians served to divide the western moving tide of the Slavs into two streams, diverting one into the maritime plain of northern Germany and Poland, the other into the channel of the Danube valley, which guided them to the Adriatic and the foot of the Alps. . . . The Alps long retarded Roman expansion into central Europe, just as they delayed and obstructed the southward

advance of the northern barbarians. Only through the partial breaches in the wall known as passes did the Alps admit small, divided bodies of the invaders, like the Cimbri and Teutons, who arrived, therefore, with weakened power and at intervals, so that the Roman forces had time to gather their strength between successive attacks, and thus prolong the life of the declining empire. So in the Middle Ages the Alpine barrier facilitated the resistance of Italy to the German emperors trying to enforce their claim upon this ancient seat of the Holy Roman Empire."

It is necessary to go back only a few years to the time of the World War to see how those mountains of the Tyrol and the Dolomites enabled Italy to repel the attacks of the Austrians. If there had been flat plains between the two countries, it is doubtful whether Italy could have put up any barriers that would have in any way been comparable to that vast stretch of mountains.

"As the surface of the earth presents obstacles, so it offers channels for the easy movement of humanity, grooves whose direction determines the destination of aimless, unplanned migrations, and whose termini become, therefore, regions of historical importance. Along these nature-made highways history repeats itself. The maritime plain of Palestine has been an established route of commerce and war from the time of Sennacherib to Napoleon. The Danube valley has admitted to central Europe a long list of barbarian invaders, covering the period from Attila the Hun to the Turkish besiegers of Vienna in 1683. The history of the Danube valley has been one of warring throngs, of shifting political frontiers, and unassimilated races; but as

the river is a great natural highway, every neighboring state wants to front upon it and strives to secure it as a boundary."

It would be possible to write several volumes showing what a dominant part in molding the history and in characterizing the civilization of every race the geographic environment has been. We are stopping here, not because we feel that the subject has been in any way exhausted, but because there are so many other things that must be treated. However, it will be necessary constantly to refer to this part of the subject, for no matter with what topic we are dealing, whether it be language, or religion, or government, we will see in each one the guiding hand of nature.

CHAPTER VIII

THE MAKING OF LANGUAGE

IT is a strange fact that those things with which we are most familiar, which we are using every day of our lives, are the things to which we give the least conscious thought. Language is one of these. It is a tool that we laboriously learned to use as children, but once having acquired the power of expression we cease to think very much about it. We are talking constantly, we think in terms of words, but how much does the average person know about the simple steps through which our cave-man brother went in order to give us this most vital of human accomplishments? Human beings have not always been able to talk in what we term language, for there must have been a beginning when man could do no more than grunt his wants and his feelings. If we accept the evolutionary theory, we realize at once that when man became man he was not in possession of a well-developed language, in fact he probably did not have brains enough to talk very much, even if such a language could have existed. Through the ages, step by step and sound by sound, as the human brain developed and grew, language slowly evolved, until we find ourselves to-day in possession of the greatest gift on earth.

Is man the only animal that has language? The answer is probably "yes," but on the other hand we know that the lower animals have means of com-

municating broad ideas to each other. These methods of expression are, however, so crude that we cannot apply the word language to them any more than we can apply it to the same methods used by the most prehistoric of men. It is, however, instructive to consider for a moment how the animals make their wants and feelings known to each other and to human beings. When a hen sees danger approaching she will cluck to her chicks and they run to her protecting wings; if she has found a nice fat worm, she will also cluck, but there is a different tone in her call. The little ones will still run to her, but not in fear. The dog will give an angry growl if anyone comes near her pups, and it is almost as clear as though she had said, "If you touch these puppies, I will bite you." The same dog will give a warning bark if a stranger comes into the house, but when she sees her master her bark of joy and her wagging tail tell a different story. It seems obvious that animals can express by different means such broad ideas as fear, joy, and pain, but whether it is possible for them to do more, is very doubtful.

Wherein, then, lies the chief difference in the means of communication between man and the animals? In man, speech is arbitrary; that is, certain sounds which we call words have come to mean definite things. These can be expanded, almost at will, and can be changed as new conditions arise. But with the animals their means of communication are natural and instinctive. They are born with this ability, while man has to be taught to speak.

We have used the term language and yet we have not defined it. Possibly one of the shortest and best definitions is that language is the expression of human thought. Of course the stone implements of

the savage, and the great buildings of the civilized world, in fact, all material civilization is the expression of human thought, and so to restrict the use of this definition we may say that it is expression for the sake of communication.

Language has at least two functions. The first is to permit people to communicate with each other, and the second is to enable men to pass on the knowledge of the world. If men did not have this means of expression they would be little above the animals.

Language is entirely a product of society. If it is possible to conceive of a person living alone all his life without ever coming in contact with other people, such a man would never develop a language. There would be no need of it, for there would be no one with whom to talk. There are known cases where a civilized man has been shipwrecked on an uninhabited island and has remained there alone for many years. At the end of that time he has been rescued, but he has forgotten how to talk, and although his countrymen have addressed him in his native tongue, yet he has not even understood them. In all cases the men have been of normal intelligence, so that the incidents prove more conclusively than anything else could that language is a social product.

It does not need a large group in order to develop means of communication, for if two children were left alone without being taught to speak they would soon devise a language of their own that would be of sufficient breadth to enable them to convey their everyday ideas. Just as language making was one of the early steps in the development of civilization, so we find that most children enjoy making up

"secret" languages that only they themselves understand. There are instances where children have been able to converse freely in a language of their own invention.

Is language necessary for thought? This is a question that has presented itself a good many times. The answer is "no," but for any complicated thinking, language is most vital. A dog will apprehend a tree, a house, a person; that is, he sees these objects and knows they are there, but they are not registered on his brain in terms of a word. A human being will go out for a walk, will see and know all the passing objects, yet he is actually thinking about something else in terms of words. The man living alone who has never had a language certainly thinks about a great many things and also reasons about the activities of his everyday life. But these perceptions of the animals and of man are about simple material objects that can readily be photographed on the brain in other terms than those of words. Let man, however, try to carry on a mental argument without employing words, on some such subject as "The Innate Value of Truth" or "The Theory of Justice as Applied to Modern Business" and he is lost before he begins. We are able to say, then, that while language is not necessary for thought, yet without it ideas would be awkward, feeble, and indistinct. On the other hand, there are many feelings that are too deep for words. Let one try to express adequately a great sorrow or an overpowering love by means of words alone and there is a hollow ring to them, for the real feeling is not there. If we add looks, mode of expression, and gesture, we are able to intensify what we say and convey with better meaning our thought.

It does not always of necessity mean, because a people have a rich language, that they are able to express abstract thought. For instance, the Eskimos have at least twenty words that signify fishing for particular kinds of fish, but they have no word meaning "to fish." There were certain American Indian tribes that could talk about a fir tree, an oak tree, an elm tree, but they had no separate word for tree.

It is interesting to note in passing how much more the tone of voice in which we say a thing conveys the meaning than the actual words used. And the tone of voice is largely dependent upon the facial expression. Let a person say, "I hate you," with a smile on his face, and try as hard as he will to counteract the effect, the tone is pleasant. Or let him say, "I am so happy," with a scowl, and his tone absolutely belies the words.

It is not only the tone that conveys the thought, but also the emphasis that is placed upon the different words. Professor Whitney illustrates this by the sentence: "I never sold you that horse." If the emphasis is placed on "I" it means that the speaker never sold the horse, but some one else did; if "never" is brought out it means that the speaker at no time sold it; if "sold" is emphasized it may mean that the horse was given away; if the weight is put on "you" we infer that the sale was made to another person; if "that" is brought out, it means "I never sold you that horse in the stable, but the one in the yard"; and if "horse" is the word emphasized the speaker admits having sold the cow, but not the horse. This point also shows the value of the spoken word over the written, for if this sentence were put down on

paper without any further explanation, it might mean any one of six different things, while if it is spoken with the proper emphasis, the meaning is clear at once.

We often hear a public orator say that he has been misquoted and that he never meant to convey the idea attributed to him. This frequently comes about by a reporter changing the emphasis and then commenting unfavorably upon the new thought. However, the orator, as a rule, has the advantage over the writer, for he can by his tone, gesture, and expression, move his audience in a way that none but the most skillful writer can do.

The second function of language, as we have seen, is to pass on the knowledge of the world. If every child, if every generation had to begin again at the bottom of civilization and gradually build up anew all the arts and sciences and religions, no progress would be made, for the first simple steps over and over again would absorb all the racial energy. Language has enabled people from the beginning to store up all kinds of knowledge and wisdom and to pass this on to the generations to come so that each child starts his career of education not at the beginning, but far up in the scale, heir to all the knowledge that has gone before.

As learning to speak is one of the first steps in the education of the child, so it was in the education of the race. No progress of any kind could have been made until people were able to convey more than their crudest thoughts to each other. "Into a few years of instruction are now crowded, for the young student, the net results of as many tens of centuries of toiling after wisdom on the part of no small portion of mankind. And, in like manner,

into the language learning of the first few months and years is crowded the fruit of as many ages of language making."

Those races which have the richest language are the ones which possess the greatest thought power. Many savage people have been taught a modern language, such as English or French, who have confessed, after they have mastered it, that there were opened up for them avenues of thought of which they never dreamed. There are many people who fail to see the cultural value of learning any other tongue than their own. They little realize that by this attitude they are limiting themselves practically to the authors and great thinkers of their own race. Although there are translations of nearly all literatures, yet in even the best translations much of the richness disappears. There are words, phrases, thoughts, that have no exact parallel in any other language and so it means attempting to substitute, more or less crudely, something that may approach the thought. But the inner soul of the writer has been left behind, and it can only be captured by learning to think and talk in his own tongue.

We have now laid the background for our study as to the ways and means whereby early men communicated their budding ideas and feelings to each other. They had, of course, no words at first that might convey thought and so they were little better than the animals. They did, however, have greater brains and the power of reason, so that they could soon devise methods for breaking down the barriers.

Probably one of the first forms of communication was by means of the gesture. Even to-day people who cannot speak, such as the deaf and dumb, resort to this method. In the simplest form, touch-

ing or pointing to the object means merely that object and nothing else. If a child wants a glass of water that is in the room he points to it, or if the savage wishes to call some one's attention to a passing animal he will indicate it with his finger. By means of these simple gestures it is possible to convey a good many ideas. A boy comes into a room where his father is sleeping and his mother is sewing. As the door opens the mother puts her finger to her lips to show the boy that he must not waken his father. The boy makes a motion with his lips as though he were eating and points to a box of candy on the table. His mother nods and so he tiptoes over and opens it. He holds up two fingers to his mother to find out if he can have that number of pieces, but she shakes her head and holds up one finger. The boy eats the candy and then, desirous of going down to the pond for a swim, makes the motions of swimming with his arms. His mother shakes her head, points to a spelling book on the table, and then points up, indicating that the boy must go upstairs and study his lesson. All this is carried on without the use of a sound.

A traveler in a country, the language of which he does not know, resorts almost entirely to gestures in order to get his wishes. He arrives at a hotel, covered with dust, and he makes a motion on his coat to indicate that he wants a brush; he then goes through the movements of washing his hands, and finally he raises an imaginary glass to show that he wants a drink.

The gestures develop with time and become more complicated so that instead of conveying one simple idea they may mean any one of a dozen things. A person will point to an object, such as a shoe,

but instead of meaning the shoe he has in mind some attribute of it such as leather or toughness. He may point to the sky to mean blue or to the grass to signify green. In all these cases qualifying words are also necessary in order to convey the exact meaning. If he makes an air picture of a box and points to the grass he means a green box, or if he indicates the sky and then himself he may be trying to tell his friend that he is feeling blue. A drinking gesture may mean either to drink or some specific kind of liquid, in each case an added movement must be given to make the meaning clear.

There are two well-developed sign languages in the world to-day; that of the deaf and dumb, and that of the American Indians. In both of these, most of the signs at the beginning were perfectly clear in their meaning, but time has altered and abbreviated so many of them that without a careful study the meaning is now obscure. A single motion may convey a complete thought, the meaning of which has been agreed upon before hand. In the deaf and dumb language an entire alphabet has been made up, together with single arbitrary signs for words, so that it is possible for those using it to carry on a conversation.

It is interesting to look at a few of the gestures in the Indian sign language that still show, upon explanation, their original form. The sign for *man* is made by pointing up with the index finger while the back of the hand is away from the body. This came from the idea that man was a creature who walked upright. *Woman* is shown by sweeping down the side of the head with the fingers extended to indicate long hair, or the combing of the locks.

A *white man* is designated by clasping the forehead with the thumb and index finger, or by drawing the fingers across to show a hat. The sign for *Indian*

FIG. 43.—INDIAN PICTURE RECORD

A Blackfoot war record in which the deeds of Bear Chief, Double Runner, and Big Nose in their fights with the Assiniboins, the Gros Ventres, the Crow Indians, and the Crees, are set forth. (Wissler, Indians of the Plains. American Museum of Natural History.)

means a person of the same color and is made by rubbing the back of the left hand or the cheek with the palm of the right hand. As this is now a con-

ventional sign, the white man may likewise use it in speaking of the Indian. A *Blackfoot* Indian is shown by touching the moccasin and then something black. The *tipi* or cone-shaped tent is indicated by bringing both index fingers together like an inverted V, and if these Indians wanted to speak of a house, they would make this sign and then the one for white man. The sign for *buffalo* and *cow* is the same, a crooked index finger at the side of the head to show a horn. The symbol for *dog* is not clear unless the derivation is known. This animal used to be the beast of burden. He dragged the loads, which were placed across a long pole fastened to each of his sides, so that the two rear ends trailed on the ground. As this made a V-shaped affair, the sign for dog is now made by spreading the first and second fingers apart and drawing them across the front of the body.

The one great difficulty with the Indian sign language is its inability to express grammatical words such as *the, which, and.* It is also hard to convey abstract thoughts very much in detail, for while they have arbitrary signs for *truth, honor,* and the like, yet they would have trouble in carrying on a deep argument involving these conceptions. The deaf and dumb language obviates this difficulty by spelling out the words.

The following petition of one Indian chief to another is given, first with all the connective words in place, and second showing what words only were expressed by the gestures:

"I arrived here to-day to make a treaty. I have with me one hundred lodges which are camped beyond the Black Hills near the Yellowstone River. You are a great chief. Take pity on me, for I am

poor, and I have five children who are sick and without food. The snow is deep and the weather very cold."

"I — arrive — to-day — make — treaty. My — hundred — lodge — camp — beyond — hills — black — near — river — Elk. You — chief — great — to pity — I — poor — my — five — child — sick — food — wiped out — snow — deep — cold — strong."

This sign language has played a very important part in the history of the Indians, not only in their dealings with each other, but also with the whites. There were so many unrelated tribes scattered over such a large territory, and speaking so many different languages and dialects, that when they came together in war, peace, or trade, they had to have a common means of communication. The sign language was evolved to give them this. It enabled men from the north, south, east, and west to talk with each other with some degree of fluency. Some of the treaties made between the Indians and the whites were negotiated on the basis of these signs, for it was obviously impossible for all or even a large part of the numerous languages to be known by Europeans making the treaties.

When man began to use the human voice as a means of communication he had a medium which was in every way superior to gestures. In the first place, when a man is talking with his hands he can do no manual labor; the person to whom he is talking must, of necessity, watch him, and hence his work, too, is hindered. With the spoken language both can work and talk at the same time. A second great advantage is that with the voice people can talk to each other, although they may

be in separate rooms, around a corner, or have their backs turned. A third virtue that the spoken word has over that of the gesture is that conversation may be carried on in the dark. It is reported that there are some savage peoples to-day whose spoken language is so meager that they are unable to talk very much unless a light is present. One other advantage, and by no means the least important, is that with the voice shades of meaning and expression are possible that are lost entirely in the gestures.

We will now take up the first form of spoken language, which was equally as primitive as the gestures. It is difficult to say which came first, or whether they both appeared at about the same time, hence, for the sake of simplicity, we will assume the latter suggestion. These first human noises, for that is what they really were, we call emotional cries, of pain, joy, anger. They began by being entirely instinctive and were, therefore, no higher than similar sounds made by most of the animals. As such they were not language, for the individual was relieving his feelings and not trying to tell anything to another person. We all do this kind of thing to-day. If a man is alone and gives his finger a sharp blow with a hammer he will say "Ouch"— or something to that effect — and if he suffers prolonged pain he will groan, although he knows that no one is near him. This sound turns into language when it is repeated, no longer as an instinctive utterance, but to tell some one else that the speaker is or has been in pain.

Probably very early the gestures and the emotional sounds were combined as an aid to conveying the meaning. If a man wished to show that he had a

slight pain in his stomach, he would point to that part of his anatomy and groan, or if he wanted food he would point to it and smack his lips.

If we analyze these sounds further, we will find that they are really imitative, for they are the reproduction of cries called out by real emotion. This idea is carried out a little further in the imitation of the sounds in nature. It is here, probably, that we find the first words coming into the language. A young child to-day who does not know the words for dog or cat will speak of the animals as *bow-wow* and *miaou.* So the ancient man took the sounds about him and formed them into the first real spoken language. Any man to-day, whether on the highest or lowest stage of development, would understand that a dog was meant when the speaker said *bow-wow,* or a cow, if *moo* was uttered.

There are a great number of words in the English language whose origin can be traced directly back to these gesture sounds. Children delight in them because it is their only means of talking about things so that every one will understand. They speak of a clock as a *tick-tock,* of a pigeon as *coo,* of a donkey as *hee-haw,* of a bell as *ding-dong* and of a knocker as *rat-tat.* Words of this general character are common in all languages. For instance, in Egyptian the word for *donkey* is *eo;* in Sanskrit, *crow* is *kâka;* in Chinese, *cat* is *mau;* and in Australian, *fly* is *bumberoo.*

There are many other words in English which by their sound convey the meaning. We speak of the *bang* of a gun, the *boom* of a cannon or the waves, the *hiss* of a snake, the *roar* of a lion. When two hard bodies come together we may use the following:

clap, rap, tap, snap, trap, flap, slap, crack, smack, whack, thwack, pat, bat, batter, beat; and there are other sound words such as clash, flash, plash, splash, smash, dash, crash, clang, twang, ring, ding, din, pump, bump, thump, hum, drum, rustle, bustle, whistle, whisper, murmur, babble. Likewise sounds of motions and actions: whirr, whizz, puff, fizz, fly, flit, flow, flutter, patter, clatter, crackle, rattle, bubble, dabble, rush, shoot, shot, shut. The following examples of the same sort of things are taken at random from other languages:

Sneeze—haitschu (Tecuma of Brazil).
Sneeze—tis (Welch).
Gun—pung (Botocudo).
Blow tube—pub (Quiché).
Whistle—pipit (Malay).
Drum—dundu (Sanskrit).
Flute—ulule (Galla).

And so it was on this basis that language started. Crude and simple at first, it grew with man's ever-increasing brain power; new words and sounds were added, until there appeared a well-developed means of communication. But the growth of language never has been finished nor will it ever be, for new things are constantly being made that require new words. If a language could not expand with civilization, it would be as useless as a child's dress for a grown-up person.

Let us trace by means of an illustration how some of these changes might come about. We will suppose that a people without a written literature moved from the tropics into the temperate zone. In their new environment there would be many things which they had never seen before and for which they had no words. They would immediately make up

new ones or adapt the old ones so that in a few generations the whole character of the language would change. Words expressing such things as jungle, lion, tiger, would drop out and new ones for the strange animals, for the different kinds of vegetation, for snow and ice, would come in. After a short time, when those who had done the moving from the south to the north were dead, the old forms would have been forgotten. Thus the language would change.

But this is not the only way. Among some of the savage tribes in Africa they have such a fear of the dead that they will do all in their power to prevent the spirit from returning. If the person was a prominent chief who had been cruel on this earth, and who might come back to injure the people after death, they drop out of the language all words that in any way sound like his name. The idea is that if he heard these words he might mistake them for his name and return, thinking that the people were calling him, and when back, could do all kinds of harm. Hence, to keep him where he belongs on the other side, they will almost change their language. If, within a short time, several chiefs pass on, almost a new vocabulary will take the place of the old.

When Rome was conquering the world she adopted a policy with the vanquished that proved successful. Instead of trying to change their religion, their customs, or their language, she allowed them to keep these, but she started to trade with them. This, in time, led to a change of language, for she introduced new products to them that, of course, had Roman names. The people in accepting them would also take the names rather than make up new ones. With these products came new ways of doing things, for which there were Roman terms. Ultimately, by

imperceptible steps, the language of the conquered people would be almost Roman in its character.

The changes that have been made in the modern languages have not been done by the conscious effort of any individual. They have come about very slowly by changing a letter in a word here and dropping one there. The mispronunciation of a word by a large part of the population will ultimately bring it into good usage while the older form drops out entirely. Within the last generation such things as the automobile, the airplane, the submarine, have come to be part of our everyday life and with them a whole new vocabulary. Each country has customs and games of its own that are not common in another country speaking the same language. Let an Englishman, for instance, pick up a morning paper and read an account of a baseball game, and although it is, theoretically, written in English, he will no more understand it than if it were in a foreign language. Each section of the United States has its own colloquialisms or slang expressions which, if used long enough, may come to be regarded as good usage. If the reader will picture this condition of things going on for several hundred years it will be obvious how a language may change.

If a person who lived a hundred years ago were to return to us, he would find much in our everyday speech that he could not understand. Should Shakespeare come back and read to us from his own works we should understand very little of what he said, because of the changes in pronunciation that have taken place. In reading Chaucer's English of five hundred years ago we need the help of a glossary. King Alfred's English, of a thousand years ago, which we call Anglo-Saxon, is similar to German.

Professor Whitney illustrates these changes by giving a passage from the Bible in Anglo-Saxon and then showing the real English translation. "'Se Haelend fôr on reste-doeg ofer aeceras; sôthlîce his leorning cnihtas hyngrede, and hî ongunnon pluccian thâ ear and etan.'

"No ordinary English reader, certainly, would understand this or discover that it is the equivalent of the following sentence of our modern version: 'Jesus went on the Sabbath day through the corn; and his disciples were an hungered, and began to pluck the ears of corn and to eat.' Matthew xii: 1.

"And yet, by translating it as literally as we can, we shall find that almost every element in it is still good English, only disguised by changes of form and of meaning. Thus: 'The Healing (one) fared on rest-day over (the) acres. Soothly, his learning-knights (it) hungered, and they began (to) pluck the ears and eat.'"

As languages develop, the meaning of words change so that if we were to compare the uses as they now stand we would find that they had moved a long distance from their original forms. We will pick a few from English at random to see some of these changes. *Paper* no longer is made of papyrus; a *gazette* is not sold for a Venetian penny; the *bank* has outgrown the bench of the money changers; a *candidate* is no longer expected to dress in white; *copper* and *muslin* come from other places than Cyprus and Mosul, respectively; a *lunatic* is not thought to be made so by the influence of the moon (Luna); the word *butterfly* is not given only to a fly of butter color; *simple* used to mean without fold; *double,* twofold; *relation,* carrying back; and *invest,* to put on clothes.

As our language has become more complicated we attach various meanings to the same word. If we were to stop to think we should see how ridiculous some of them are. For instance, as fruit is apt to be green when it is unripe, we use the word green as a synonym for unripe. Hence we can say that "blackberries are red when they are green."

"Our minds delight in the discovery of resemblances, near and remote, obvious and obscure, and are always ready to make them the foundation of an association that involves the addition of a new use to an old name. Thus, not only an animal has a *head,* but also a pin, a cabbage. A bed has one—where the head of its occupant usually lies—and it has a *foot* for the same reason, besides the four feet it stands on, by another figure, and the six feet it measures by yet another. More remarkable still, a river has a head; its highest point, namely, where it heads among the highlands—and so it has arms; or, by another figure, branches; or, by another, feeders; or, by another, tributaries; and it has a right and left side; and it has a bed, in which, by an unfortunate mixture of metaphors, it runs instead of lying still; and then, at the farthest extremity from the head, we find, not its foot, but its mouth. Further, an army, a school, a sect, has its head. A class has its head and its tail, and so has a coin, though in quite a different way. A sermon has its heads, as divided by their different headings; and we can beg to be spared anything more 'on that head.' A sore comes to a head; and so, by one step further away from literalness, a conspiracy or other disorder in the state, the body politic, does the same. We give a horse his head, which he had before our donation; and then we treat in the same way our

passions—that is to say, if by their overmastering violence we lose our heads. And so on, *ad infinitum.*" Is it any wonder that a foreigner has difficulty in learning the English language?

The history of a race is very closely bound up with its language, but the history of an individual is not always. Because a man speaks fluently French, or English or Italian, it does not necessarily mean that he is of French or English or Italian parentage. The negroes were brought over to this country from various parts of Africa where they spoke as many different languages and dialects, yet to-day they speak English as though it were their native tongue. A man who is called François, or Giuseppe, or Wilhelm, if he has been brought up in a foreign country, will probably speak the language as though he were a native. If, however, a man has remained in his native land and speaks its language, his history becomes coincident with that of the race. Likewise, if a race has lived together in its own country, the language will remain as a mark common to all. Of course such things as migration, intermarriage and conquest will come to many groups, so that the language cannot tell all about the ancestry, but, as a rule, it can tell a very important part.

We know that languages as they are found to-day did not spring into existence separately, but are related to other modern languages and to older languages. There is great danger in trying to show relationship between languages that have only a few words in common, or of trying to trace such back to some parent tongues. In any two languages there are apt to be some similar words by accident, but this coincidence does not prove that their origin is the same. For example, in the Society Islands the

word for *cloak* is *tiputa* and in English *tippet* was used in a similar sense. The Hindus and the savages on Vancouver Island both call a *crow*, *kaka*, from the bird's cry.

In order to be able to say that two languages came from the same source and are therefore closely related, we must discover such similarity in the roots and the structure that neither chance nor borrowing can account for the resemblance. We know that Dutch and English are allied and the following short sentence will illustrate this:—

DUTCH

Kom hier! Wat zegt gij? Hoe is het weder? Het is een hevige storm, ik ben zeer koud. Is de maan op? Ik weet niet.

ENGLISH

Come here! What say ye? How is the weather? It is a heavy storm, I be sore cold. Is the moon up? I wit not.

To anyone who knows German the relation between that language and Dutch is just as striking.

Those languages that belong to the Romance group —Italian, Spanish, French—are the direct descendants of Latin, but to make the point clear we will give a quotation from each language with the Latin equivalent, paying no attention to the grammar of the older language.

Italian—E meglio un uovo oggi che una gallina domani.
Latin—Est melius unum ovum hodie quid una gallina de mane.
i. e., Better is an egg to-day than a hen to-morrow.
Spanish—Quien canta sus males espanta.
Latin—Quam cantat suos malos expav(ere).
i. e., He who sings frightens away his ills.
French—Parler de la corde dans la maison d'un pendu.
Latin—Parabola de illam chordam de intus illam mansionem de unum pend(o).
i. e., (Never to) talk of a rope in the house of a hanged man.

If any one of the modern languages is examined, it will be found to contain a large number of foreign words. Since these have come through contact with other races, it is possible by them to tell something of the character of that contact. If, for instance, we know that the words chocolate and tomato are of Mexican origin, we are fairly safe in saying that that country was the home of these products. Many of the religious words in our language, such as Sabbath, jubilee, seraph, come to us from the old Hebrew, showing that our religion has a Hebraic origin. From the Italian we get most of our musical terms, such as opera, sonata, concerto, words which tell us without a doubt that we adopted Italian music and terms for our use. The following list of a few of our commonest foreign words tells us where many of our products or our ideas came from:

Arabian—Zero, algebra, cipher, magazine, alkali, zenith, lemon, sugar, sherbet.
Persian—Caravan, chess, shawl, check.
Hindu—Calico, chintz, punch, toddy.
Chinese—Tea.
South Sea Islands—Taboo, tattoo.
Haiti—Hammock, hurricane.
Peru—Guano, quinine.

Were we to trace the origin and relationships of all the languages in the world to-day we would need to fill many volumes. This is obviously out of the question, but it is important that we have in mind to what different branches those of the white race are related. They can all be traced back to two, the Aryan and the Semitic. The Aryan, or Indo-European, as it is sometimes called, takes in the languages of part of south and west Asia and nearly the whole of Europe. The Semitic language gave rise

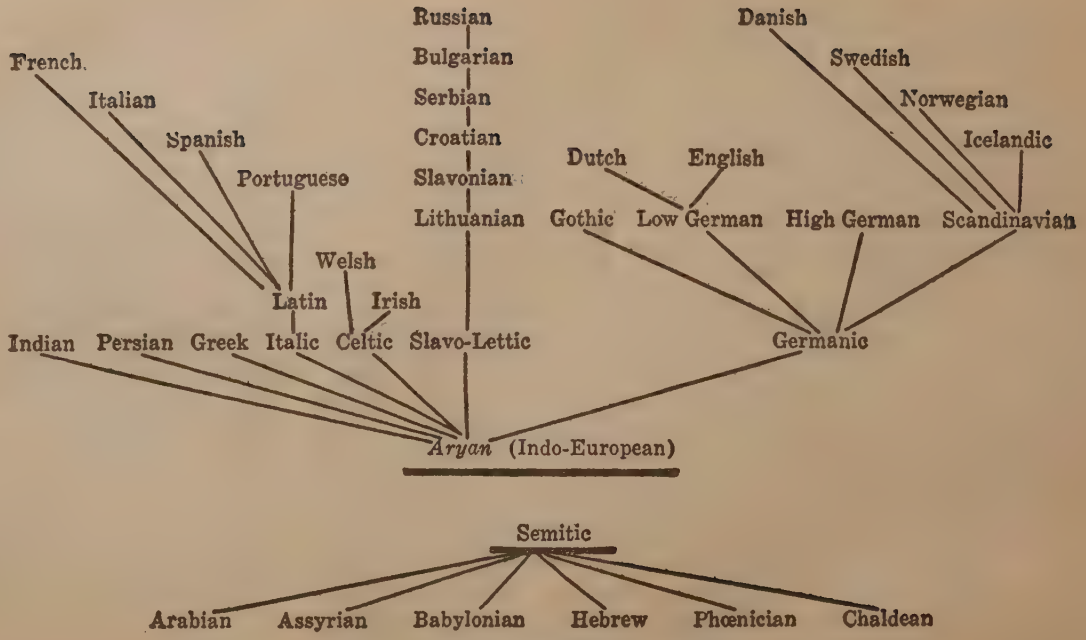


FIG. 44.—RELATIONSHIP OF LANGUAGES

to many of those south of the Mediterranean Sea. Whether these two main parent stocks had a common origin is unknown, but in all probability the languages of the world could be traced back to a few simple beginnings that have long since disappeared. At least such an idea is in accord with the evolutionary theory, and there is no reason to suppose that if this applies to all other things of civilization it should not apply to language.

This idea illustrates a point that we were trying to make in some of the earlier chapters in regard to the age of man on the earth. We know in a general way how long it takes a dialect to form from a language, and such a language as English to break away from its Low German stock. If there are on the earth to-day about one thousand distinct languages and these probably came originally from a few sources, if not from a single one, the thought is brought home to us very strongly that man is not a newcomer on the earth.

The chart on the opposite page is given with the idea of showing the relationship existing within the two great families of languages spoken by the white race.

CHAPTER IX

THE DEVELOPMENT OF WRITING

THE education of the modern child repeats within a few years the stages that the race passed through in the thousands of years of its childhood. In both cases, speaking and gestures were the first means of communication, and it was not until these were well established that writing came on the scene. To the savage man of to-day, that which we call writing is a sacred thing, for he sees nothing in these twistings and turnings that could tell a person anything.

It is related that a missionary in the South Sea Islands, who was doing some carpentry work, wrote on a chip of wood with a piece of charcoal a request to his wife for his T square which he had forgotten. A native chief acted as the messenger, and when he saw the result produced by the chip, he wore it around his neck as a sacred thing and told all his friends that the wood could talk without a mouth. The Chinese regard the written character with great veneration and they have boxes placed at street corners for any piece of waste paper upon which there is writing. The contents of these boxes are burned with great veneration in the temple of Confucius.

Before we begin to trace the steps in the development of this art, it is important that we should know the purposes of writing. Probably the first and

fundamental one is to enable people living at a distance to communicate with each other. There are other ways of doing this, as when the American

FIG. 45.—THE QUIPUS

The device of string, colored threads and varied knots, by which the ancient Peruvians conveyed messages. (From specimens in the American Museum of Natural History.)

Indians would relay messages across the country by means of signal fires. The attendant at each place would build a smoky fire and cover it with a blanket. Then, by the size of the puffs allowed to escape and the length of time between them, he

would send the message. The Incas of Peru, although they had a very high civilization, did not have any form of writing. When they wanted to preserve records or send other than verbal messages they used what they called the quipus. This was a

FIG. 46.—AUSTRALIAN MESSAGE STICKS

These carved and notched sticks, from North Queensland, Australia, convey the messages indicated by the arrangement of cuts.

cord about two feet long made up of various colored threads twisted together, from which a large number of smaller threads were suspended like a fringe. These threads of different colors were tied into knots. The colors represented various ideas, white meaning silver or peace, yellow standing for gold, and red, war. To the mind of the messenger the color of the knot, the way in which it was tied and the number of knots on a colored strand served as reminders of the message he was carrying. It was, of course, impossible for the man to hand the quipus over to the one for whom the message was intended and expect him to read it, any more than a man of to-day could show the knot which his wife had put in his handkerchief to the grocer and expect him to know what article was wanted. This same general idea is found among the Australians, where the messenger will carry a notched stick. The number

and arrangement of the cuts suggests the message to his mind.

A second important function of writing is to be able to pass on knowledge to the generations that are to come. Civilization has been divided up into two parts, historical and prehistorical, and the historical began with writing. Before this time everything was passed on by word of mouth, but a method like this is, at best, inaccurate.

There are, of course, other uses to which writing may be put, such as marking objects to show possession, making notes as reminders of things to be done, and so on, but the first two mentioned are really the most important.

The early forms of writing and the gesture language bore a very close relationship to each other, for they both attempted to picture the idea.

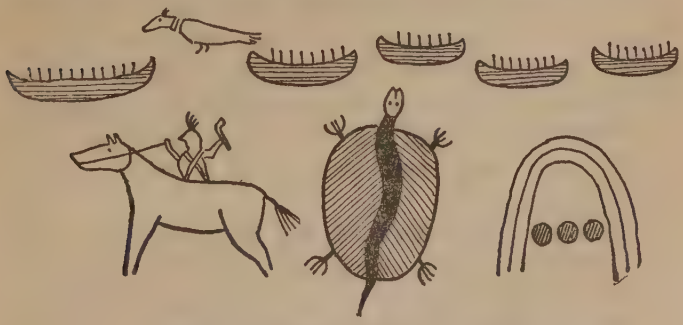


FIG. 47.—SIMPLE PICTURE WRITING

From a rock in the vicinity of Lake Superior. (After Schoolcraft.)

In the gestures, if the speaker pointed to a dog he meant that animal, while in early writing a picture of the beast conveyed the same thought. But there were soon added to this, other forms, where the picture did not mean the object itself but something

that bore the same name or quality. A picture of a wolf would mean not the animal but a chief or a tribe by that name. This is the first step toward sound writing, in which the picture stands for the sound of the spoken word. It will be recalled that a similar step took place in the development of the

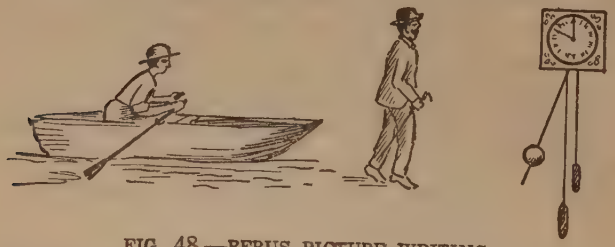


FIG. 48.—REBUS PICTURE WRITING

The word "romantic" indicated by pictures suggested by the sound of the syllables.

later gesture language, when, if a person pointed to a stone, he might possibly mean some one of that name. A still further development in both writing and speech is reached when a quality is expressed by some object possessing it; when the skin of an animal may represent leather or a stone signify hardness.

All of us as children played the game of rebus, but we did not realize that in so doing we were taking one of the steps in the development of the history of writing. It was done by drawing pictures of objects, the sound of whose names made up the word or words. For instance, the first picture would be that of a man rowing, the second would be that of a man, and the third a clock ticking. From the first we get the syllable *row,* from the second *man,* and from the third *tic,* thus making the whole word *romantic.* It will be seen here that the pictures do

not stand for their meaning, but for the sound of their names. This is truly phonetic writing of a crude sort, but it shows how writing, as we know it to-day, came to be invented. There are, however, many intervening steps between this form and the later development.

It is interesting to note in this connection that when the Spaniards came over to Mexico they found the people writing the names of persons and places in this rebus fashion. Even when the priests taught them Latin they managed to record it by means of their own phonetic picture writing. In writing *pater noster* (Our Father) they first drew a picture of a flag (*pan*), then a stone (*te*), and a prickly pear (*noch*), which gave them *pa-te-noch-te*. This did very well since they had no *r* in their language.

The analogy with the gesture language might even be carried through this step where people act out words. We call this charades, but it is based on

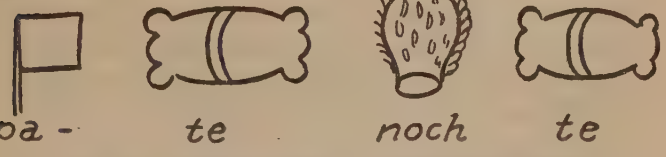


FIG. 49.—PATER NOSTER IN AZTEC CHARACTERS

In this manner the Spaniards contrived to convey the sound of the Latin words through picture writing. (After Auben.)

the early idea that the meaning of the parts had nothing to do with the meaning of the whole.

The early Chinese written language was based entirely on pictures. Fortunately there remain for us to-day many of these ancient symbols, but unfortunately most of the intervening steps between the old and the modern have been lost. It is, of

course, possible to compare the two and to see the connection existing between many of them, but others had so many transitional steps between that the original form is gone. In the following figure the old forms are obvious and a person could tell the meaning of the sun, the moon, and the dog,

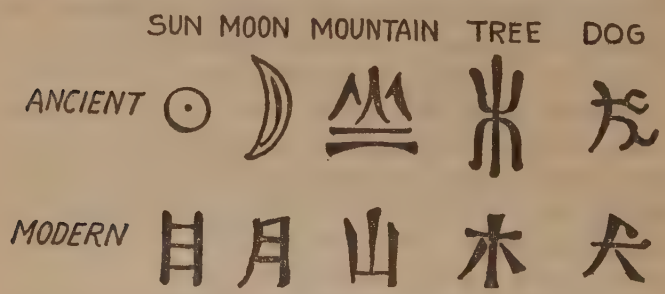


FIG. 50.—CHINESE IDEOGRAPHS

Here the ancient Chinese writing, in which the written form actually suggested the idea, is compared with the modern symbols for the same words. (After Endlicher.)

without any explanation. It needs only a little imagination to see the mountain with the three peaks and the tree with the branches going up and the roots down. The word for home, originally, was a picture of a pig under a roof and in the character to-day the same thought is discernible.

The Chinese language has many characteristics that differentiate it from any other language that we know. In the first place it is entirely monosyllabic, that is, the words are all of one syllable. This means that there is no possibility of building up words one from the other as we do in English or German. They do not decline nouns nor conjugate verbs. Nearly every word has a great many meanings, most of them entirely unrelated. In speaking, the meaning is given by the rising or falling in-

flection of the voice and by placing the tone in the upper, middle, or lower register. This is one reason why it is so difficult for foreigners to learn the language, for the inflection that changes the whole meaning may be so slight that only the most practiced ear can detect the difference. It is said that there are certain sounds in the language that it is impossible for any but a Chinaman to give.

Another peculiarity of this language is that there is absolutely nothing in the written characters to show how the words are pronounced. This means that one has to learn two distinct languages, the spoken and the written. In nearly all other languages we are taught the fundamental sounds and, after mastering these, we are able to pronounce almost any word involving them.

In writing this language they first put down the basic word and then add various other symbols to show which meaning is intended. If we had this system in English and wanted to use the word pike in the sense of a spear we would merely draw a

FIG. 51.—CHINESE COMPOUND CHARACTERS

A symbol which means one thing when standing alone, in combination with another symbol has an entirely different meaning. (Tylor's Anthropology.)

picture of this weapon; if we meant pike, a fish, we would draw a spear with a fish before it; or if we meant road, we would draw a spear with two straight lines before it.

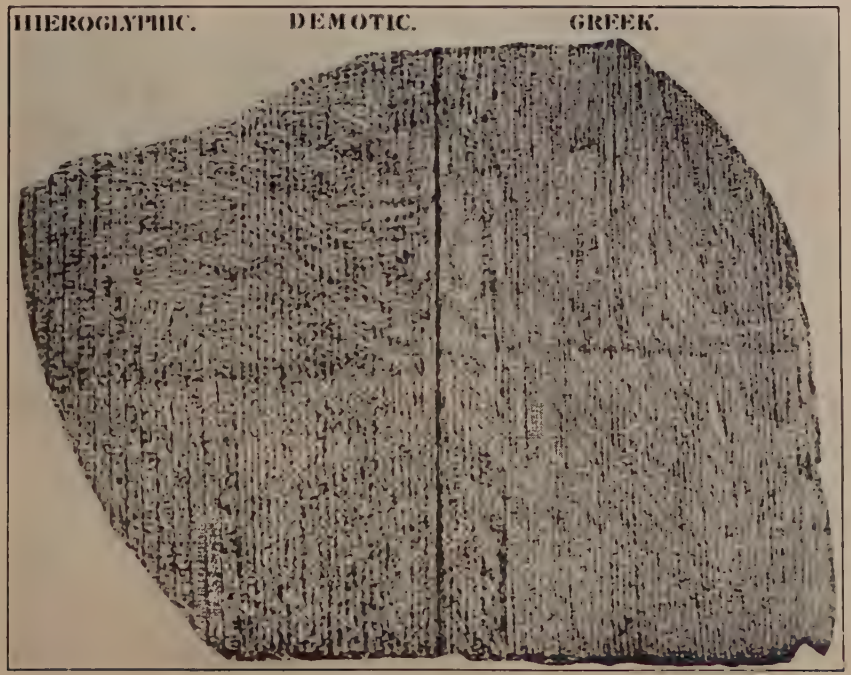
In Chinese the word *chow* may mean ship, fluff, flickering, basin, or loquacity. In the above figure

chow as standing alone means ship, and for each other meaning there is an additional symbol. A pair of feathers gives it the meaning of fluff; the sign for fire makes it flickering; that for water, basin; and for loquacity, the sign for speech.

One of the earliest known forms of writing is that of the ancient Egyptians. On all their tombs and monuments it appears, and from it we have been able to learn much of their early history. It was done in the form of what we know as hieroglyphics; that is, in pictures and symbols. For a long time those interested in things Egyptian tried to decipher the meaning hidden within these characters, but they safely kept their secret, for these ancient peoples had, apparently, left no key to their meaning.

Finally, in 1799, there was discovered at Rosetta, not far from the mouth of the Nile, a slab of stone whereon was carved in three languages—Greek, demotic, hieroglyphic—a decree of the priests at Memphis drawn up in 197 B. C. It was from this so-called Rosetta Stone, which is now in the British Museum, that the key to this most ancient written language was obtained.

These hieroglyphics or sacred sculptures were divided into two classes: the first, ideographs, or those which expressed ideas; and the second, phonetics, or those which gave sounds. Of these two forms the ideographs were the earliest, and they corresponded very closely to the written language of the American Indians. The most obvious picture is the one representing the object directly, such as that of a man to mean a man. The second type is of those metaphorically conveying the idea, where a woman beating a tambourine indicates joy.



ROSETTA STONE

(British Museum)

Photo, Metropolitan Museum

OBELISK, BEFORE REMOVAL TO NEW YORK

A third form is where an attribute is expressed by the figure of some object possessing it, such as a jackal to indicate cunning, a flaming censer to signify incense, a pair of legs to convey the idea of walking.

Later on the number of these ideographs was greatly reduced, so that one figure would express many thoughts, such as the skin of an animal to mean anything made of leather, or a ring to mean any precious stone. The pair of legs, which, as we

FIG. 52.—ARAPAHOE INDIAN SYMBOLS

Modified symbols that appear in Arapahoe embroidery, used, in different circumstances, to represent man or men.

saw above, were first used to mean walking, later conveyed the idea of locomotion in general.

These ancient Egyptians were able not only to write in terms of pictures, but also in terms of sound. The strange thing about the matter was that they were never sure of themselves, for in many cases they would put not only the picture but also the sound. They never reached the point where they were willing to trust themselves entirely to the phonetic characters or letters.

It is not difficult to see how many of the pictures turned into sounds or letters. In the figure on page 174 the third character down in the last column is R. In the hieroglyphic this is represented by an open mouth, which was pronounced *Ro*, hence the sign was used as a character or letter to spell the sound *Ro* or R whenever it was needed. It would be possible to figure out in a similar manner the

derivation of many of the letters or sounds used by more modern peoples.

In ancient Babylon there was a writing known as the cuneiform (from Latin *cuneiformis,* wedge-shaped). It was done by taking a very fine piece of wood, with a triangular cross section, and mak-

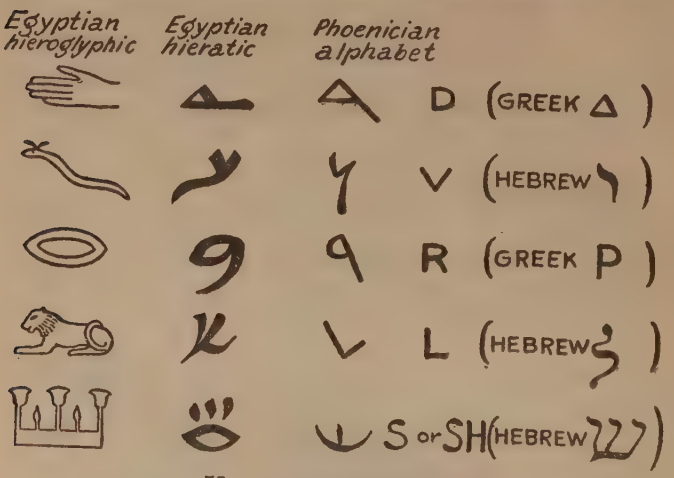


FIG. 53.—ALPHABET CHARACTERS

Egyptian characters and others derived therefrom. (After De Rougé)

ing an imprint in soft clay which was later baked. The marks are arranged in groups and rows and do not look much like pictures, yet there is evidence that they originally took this other form. The word for sun is represented by four marks placed so as to form a square, which was the nearest figure to a circle that they could get. In any piece of cuneiform writing there are groups of characters that represent objects directly, such as man, woman, river, while other groups are read phonetically as standing for syllables.

The honor of simplifying the twofold Egyptian form of writing probably belongs to the Phœnicians. They were the ones who, on their trading visits to the Land of the Pyramids, saw how useless it was

FIG. 54.—CUNEIFORM WRITING

This was employed by the Assyrians and Babylonians, who imprinted the characters in soft clay that was afterward baked.

to have both the picture and the sound symbol for the same thought, and so they took with them the phonetic part of the Egyptian writing and fitted it to meet their own language so that we are able to say that in all probability these people invented the alphabet. The figure on the preceding page shows some of the Phœnician alphabet based on the Egyptian sound writing which, in turn, had been

FIG. 55.—BABYLONIAN INSCRIPTION

At the left is a reproduction of an inscription on a Sumerian axhead. The characters are ideographs of about 2000 B. C. The illustration at the right shows how the same inscription would appear in the later cuneiform characters of about 1500 B. C. (Courtesy American Museum of Natural History.)

based on the hieroglyphics. The Greeks borrowed the Phœnician letters and from them we get the word alphabet from the first two letters, alpha, beta, of the Greek system. But the Greeks were not satisfied with their new alphabet and so they altered some

letters and made others in order to write their language more perfectly. Since that time other nations have changed forms, added others, and dropped some, to fit their needs more perfectly. The Italians needed only twenty-two letters to ex-

FIG. 56.—PHAESTOS DISK

A clay disk found on the site of an ancient city of Crete. It contains an iconomatic inscription, each symbol standing for the first syllable of the word represented.

press all their sounds, the English twenty-six, while the Russian has thirty-six.

The English language, in its attempt to keep side by side the spelling of its own tongue with French, Latin, and Greek, has reached the point where spelling and pronunciation disagree at every turn. We also attempt to keep up the ancient sounds in writing where they have been dropped in speaking, as, for example, in the words castle and scene the t in the former and the c in the latter are silent,

but in their original form castellum (Latin) and skēnē (Greek) they were pronounced. Professor Tylor says: "One wrong spelling is the result not of rule but of want of rule, and among its most curious cases are those where the grammarians have managed to put both sound and etymology

FIG. 57.—EGYPTIAN SCRIBES (ABOUT 2750-2625 B. C.)

Drawings made from wall reliefs in the tomb of Kagemni at Sakkara, Egypt, and represent the period of the Fifth Dynasty. The scribe at the right has two extra brushes over one ear and carries his palette, which has two circular depressions for paint and a groove for brushes, under his arm. The man at the left faces a writing table on which are two writing tablets and a pot of water. (Metropolitan Museum.)

wrong at once, writing *island, rhyme, scythe,* where their forefathers rationally wrote *iland, rime, sithe.* It is reckoned that on an average a year of an English child's education is wasted in overcoming the defects of the present mode of spelling." It is only necessary to look at the following words ending in *ough,* to realize that we have in

English no rules of pronunciation: dough, through, cough, tough, hough, thorough, enough, rough, sough, bough, plough.

For a long time the art of writing was confined to the priests and scholars, as there were no schools to teach the majority of the people. Even to-day in some of the older countries of Europe, where

FIG. 58.—THE BIG SNOWSTORM

A picture record by the Aztecs of a snowstorm that took place in the winter of 1447. The signs at the top indicate the years 1447 and 1448. (American Museum of Natural History.)

education is not very far advanced, it is not an uncommon thing to have in every village a scribe who, for a small sum of money, will write any letter dictated to him. In Greek and Roman times there grew up a class of copyists whose function it was to multiply books. A person could go into a bookseller's in Alexandria or Rome and buy a manuscript of Demosthenes or Livy, but as only the

scholars could read, and as these documents were expensive, there were not many private libraries.

It was not until printing was invented that books became to any extent common. Of course, every Egyptian who smeared black on his signet ring and made an impress was really printing, but it remained for the Chinese, about the sixth century, to apply this method to duplicating books. They would carve a page of their characters on a block of wood and then, by covering this with ink, would take off numberless impressions. Their writing did not lend itself very readily to movable type, but it is reported that by the eleventh century they were using separate terra cotta bricks.

There are some who still claim that Gutenberg, in Germany, invented printing, but what he really did was to take the Chinese idea and develop it. Each new step that has helped to multiply the number of books has done much for the cause of education. To-day every child in such a country as the United States is supposed to be able to read and write, but there are very few of them who, when they make their letters, realize what a long and tedious process of development has been gone through by the races to give them this art.

CHAPTER X

THE DEVELOPMENT OF NUMBER SYSTEMS

WE turn now to a brief consideration of the development of numbers. Like other things which we have discussed, counting is done in the same way by the modern child and by the savage. Each will hold up a finger to indicate one, two fingers for two, and so on. There are even civilized people to-day who will add small numbers on their fingers rather than in their heads. If we examine some of the languages of the primitive peoples we will get an idea as to how the numerical words were invented. They did the most obvious thing and merely translated their method of counting into the names for the numbers. Thus, one was "one finger of one hand," two was "two fingers of one hand," six was "one hand and one finger on the other hand," ten was "two hands," eleven was "two hands and one toe," twenty was "one man," twenty-five was "one man and one hand on the next man," forty was "two men," and so on up. There are some savage peoples who are so low in the scale of development that even this system is too complicated. With great trouble they count as high as three, but after that their brain becomes tired and so for all other numbers they say "many." We can in some measure appreciate this point of view, for when

we begin to think in big figures, say trillions, our brains become tired and we, too, are content to say "many."

The Mayans of southern Mexico and Central America had devised ingenious systems of writing numbers based on twenties rather than tens. One series of numerical signs was represented chiefly by dots and bars; another by curious face forms.

The decimal system, that is, counting by tens, which is in vogue throughout most of the civilized

FIG. 59.—MAYAN NUMERALS

The simpler of two methods by which these New World people indicated numbers. Their system was based on twenties rather than tens. There was a special sign for twenty and other special signs for some of its multiples. (Courtesy American Museum of Natural History.)

world, is based on the ten fingers of the hands. The word fifty-four means, in translation, five tens and four. Some peoples count by twenties, a system based on the ten fingers and ten toes. The Bible speaks of three score years and ten, meaning three twenties and ten, and the French have the figure "quatre-vingt quatre," that is, four twenties and four.

For modern uses ten as a basis is far from convenient, and were we to start all over again we would probably have twelve as the unit. Ten can be divided only by one, two, five and ten, while twelve can be divided by one, two, three, four, six, and twelve.

Before figures were adopted it was impossible to do more than use numbers for counting. That is, no mathematical calculations could be carried on so

long as they could indicate numbers only in terms of words. For instance, it would be almost impossible to multiply "five men and one finger on the second hand of the sixth man" by "two men and one toe on the second foot of the third man," or, to

FIG. 60.—MAYAN NUMERALS COMBINED WITH PERIOD GLYPHS

Certain definite periods of time had special signs or glyphs, usually face forms. In writing these, ordinarily an introducing sign would have been used. The periods here indicated would read: nine cycles; fourteen katuns; thirteen tuns, changed from twelve; four uinals; seventeen kin; twelve caban. The cycle was 144,000 days; the katun, 7,200 days; the tun, 360 days; the uinal, twenty days; the kin and the caban, one day. (Courtesy American Museum of Natural History.)

give an example in our own terms, divide six million seven hundred and fifty-two by nine hundred and eighty-six. We, of course, carry out such an operation by turning the words into figures, but let the reader write down either of the above number phrases and try to multiply or divide, without a thought of anything but the words. He will soon

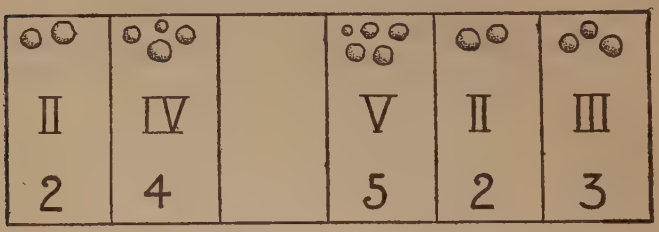
realize what a boon to the science of numbers was the invention of figures.

The writing of figures began by putting down one mark (I) to indicate one thing, two marks (II) to signify two, and so on. This system worked well for small numbers, but it was very clumsy for higher numeration. In the Roman numbers we find a simplification of this form. Arbitrary symbols, or letters, are used to represent the larger numbers, such as L for fifty, C for one hundred, and M for one thousand. Although this system is very much simpler than written words, yet it is far from easy to use these Roman numbers for any mathematical calculations. A moment's thought will show how hard it is to multiply MDCCCCXIX by MDCCCCV.

When people began to add and subtract, some simpler system than words or letters had to be devised. They probably used stones or bits of wood to stand for the units and if they wanted to remember eight things they would place this number of stones in a pile. This had the same disadvantage as the single marks when the numbers were very high. To avoid this they would use a larger stick or a larger stone for ten, and possibly some different materials for the higher figures. A later development of this same idea was to have little separate piles, the first representing units, the second tens, the third hundreds, and so on.

The Chinese invented a frame upon which there were wires with sliding beads. The first wire was for units, the second tens, etc. The merchants became so clever in making their calculations on these that they could work as rapidly as a European with pencil and paper.

Numerous forms of this same thing have been invented, such as trays divided into compartments in which beans, or stones, or similar small articles were placed to represent the numbers. If a person will rule a piece of paper, he can get the same general scheme. The difficulty, however, was that the figures could never be taken out of the columns, for while there were numbers from one to nine, there



was nothing as yet to represent the zero. If the numbers were written out of the frame, without a space for the vacant column, they would be wrong, as, for instance, 2 4, 5 2 3. In order to be correct there must be something to indicate the fact that there is nothing in the thousands column.

The invention of the 0 has been called the most important thing in science, for it simplified the whole system of numbers, enabled people to do away with the frame, and put arithmetic on a working basis. The invention has been attributed to the Arabs, in whose honor our system of numbers has been named.

CHAPTER XI

THE SATISFACTION OF HUNGER

IN the development of the civilization of the world there are several important factors, or let us call them human impulses, that have played the dominant parts. If any one of these had been lacking, society would not be what we find it to-day, any more than the individual would be able to function properly if some vital organ were removed from the body. For the sake of brevity we have called these impelling forces Hunger, Love, Vanity, and Fear, but the greatest of these is Hunger. We shall devote the following chapters to a discussion of the way in which these all-vital sensations have reacted on man to compel him to develop, create, and enjoy the things of his environment. Before taking up the first of these for discussion it is well to say just a few words as to what forces these impulses have set in motion. Hunger has driven men on to support themselves, and this act we call Self-Maintenance; love has given rise to marriage and the family, which we will include under the term of Self-Perpetuation; vanity has given rise to the æsthetic arts, whose pleasures we may call Self-Gratification; and fear, that is, fear of the unknown and the unknowable, has produced in the world Religion. It is impossible to separate these entirely from each other, for some are dependent upon others, and so we will deal with many things under the head of their most dominant impulse.

Self-maintenance may be called the art of living, not in the sense used by people to-day who remark, when they are having a very good time, "This is living." But we are using the term in its literal sense to mean the actual keeping of life in the body. This includes not only getting the food, but also means of protection against all kinds of outside forces that seek to injure or destroy the body.

The methods of obtaining food molds the entire life conditions of a people, for it is the most basic thing in the world. Suppose, for a moment, that there had been no such driving force as hunger among the animals; or let us assume that life could sustain itself on the atmosphere. All animals, under such a condition, would live peaceably together, for the cause of fighting now is food. Men would be content to live and let live, but in all probability they would develop mentally very little above the animals, for there would be no force driving them on. They would, of course, invent no tools or weapons of any kind, for they would have no need of them. For a shelter against the sun and rain, a cave or overhanging cliff would be sufficient. There would be no reason for their ever having to move from one spot in the tropics, since hunger, which has driven all other peoples on, would be lacking. Some people will say that this is their idea of Heaven, for with the creature wants taken away, the artistic side of man would have full sway. Of course we could go on speculating indefinitely in this region of the might-have-been, but we are dealing here with things as they have been and are. We will, therefore, begin with a discussion of the principal means used by man to sustain life, always keeping in mind the fact that the whole character of the civilization

at each step is dominated by his methods of self-maintenance.

We saw in an earlier chapter that civilization has developed very gradually, moving always from the simplest forms down to the complicated systems which we have to-day. In fact, the type which we find among the most ancient peoples is so crude and so far removed from our own high culture that we can see in it little to bear the name of civilization. This thought is not entirely untrue, for as compared with what we have to-day, they had nothing. If we had to exchange all the comforts of our every-day life for the things which enable the savage peoples of Australia to live, we would feel that we might just as well die. Yet it is in these crude methods used by the savages scattered over the world that we find many of the beginnings of our own great culture.

In order better to study the development of civilization through the ages, we divide it up into more or less distinct periods, or stages, and we call these the Collection Stage, the Hunting Stage, the Cattle-Raising Stage, the Agricultural Stage and, last, the Manufacturing Stage. We do not mean by this division that every race has passed through all the steps, for there are many that have never gone beyond the Hunting Stage. In fact, most of the savages now are getting their livelihood by killing and eating the wild animals that roam the woods and over the plains around about them. There are some few peoples, such as the American Indians, who passed over entirely the Cattle-Raising Stage and went to the Agricultural. However, taking the world as a whole, we find that it was necessary to pass through these five stages in the order named

before we could reach the degree of culture that we find among the so-called civilized nations of the world.

This development has taken countless ages. In fact, we must go back to the time when man first reached those mental qualities that raised him above the other animals, in order to find the beginning. There are no peoples on the earth to-day so low in their development who, we can say, show only the first germ of civilization. It will be necessary for us to travel back hundreds of thousands of years to the time of the old cave man in order to get the end of the thread of our story. He left for us, as we have already seen, buried deep in the ground or hidden in rooms of the caves, some of his material civilization. It is from these finds that we are able to piece together the evidence which will give us something of the life of the people at the end of the Collection Stage, but for the beginning we must draw on our imagination.

Let the reader picture to himself the condition of man when he first began to use the ground instead of the trees as a highway. He is similar in appearance to some of those most primitive types that we have already described. He has a shambling gait, long, hairy arms, and a low brow that shows his thought processes to be very simple. He possesses no tools or weapons of any kind except what nature has given him on himself. He easily falls a victim to all the larger animals of his environment, for they are stronger than he, they can run faster, they have keener sight, smell, and hearing. If he is attacked his only protection is to climb a tree or retreat into some cave where they dare not follow. Should he try to defend himself he has

only his hands, which are weaker than the strong paws of his opponent. His whole existence is very hazardous, for he knows not at what instant he may be attacked and killed before he can escape.

It is not only because of his animal enemies that he finds life so hard, but also because he knows not from where his next meal is coming. The food supply is scarce, and for this reason we call this earliest period of man's development the Collection Stage. He is constantly wandering over a very big area—in some places seventy square miles is necessary to supply one man—collecting what things he can to keep life in his body. He will eat anything that is not actually poisonous, and he considers no food too low for his consumption. Berries, roots, fruit, nuts, form the principal part of his diet; while he eats with a relish bugs of all kinds, snakes, worms, and the carcass of any animal which he finds in his path. The fact that the meat is partially decomposed in no way stops him from enjoying a good meal. There is time for little else besides the constant search for food, and probably many nights he lies down to rest in a cave, under an overhanging cliff, or even in a tree, with a very empty stomach.

His life is even more difficult if he has a woman and a child or two with him. In all probability he does not pay much attention to her. He may help to get things to eat for the children and her, and he probably defends them to the best of his ability from the attacks of animals and other men. However, the area that will supply him with just enough to live on will not be of sufficient size to support the woman and the children. Hence he will have to journey farther afield in order to collect the necessary sustenance for himself and his family.

He has no idea of a permanent dwelling, but will wander as the spirit wills, stopping when night overtakes him. If he reaches a region where the food is somewhat more abundant he may stay there for a time, returning at night to some convenient cave or hollow tree. As he has absolutely no property of any kind to carry with him there is no need for any more permanent place.

In all probability he does not possess fire, but if he does, it is certain that he does not know how to generate it. His food is all eaten raw, with the result that after a full meal of uncooked meat he is obliged to sleep for many hours in order to digest it. Such was the life of man on the Collection or the lowest stage in the story of human development.

It may have been hundreds, but in all probability it was thousands of years, that man remained just a little above those animals from which he had descended. But during this time he was developing very slowly in body and mind. Gradually he was losing the physical characteristics of the lower animals; at the same time his brain was growing and his power to think and to reason was increasing.

When the break came we do not know, but it is not unlikely that he first developed better means of self-defense. This would give him a certain superiority over those larger animals, whose victim he had been from the beginning. Let us try to picture the dawn of this greater brain power. The man is out hunting and has reached the foot of a steep cliff, when he suddenly looks up and sees an animal, his old enemy, approaching. There is no way of escape, for no cave or tree is near and the cliff is too steep to climb. The animal gets closer and closer

so that the man can almost see him licking his chops at the thought of the coming meal of fresh meat. Suddenly he has an inspiration. He picks up a large stone lying there and hurls it at the crouching beast. The aim is true and the beast is either killed or so frightened and hurt that it turns tail and runs. The miracle has happened and the man is master of the beast.

The stone, having accomplished its mission, is allowed to lie on the ground while the primitive man goes on his way with the sense that he has been delivered from death. He is still the child of the moment, living day to day from hand to mouth. Suddenly he is again attacked by the beast and if there is a convenient stone near he tries the same tactics which proved so successful before. Possibly the stone fails and the hungry beast kills his human prey. With the death of the man the newly acquired knowledge dies, but the race still goes on, and sooner or later the developing brain power will lead to the rediscovery of the use of the stone.

Thus far man used the ready-made missile as he needed it, but when the danger was over he forgot about it. It was not until he felt the need for keeping that stone with him as a means of defense that we see dawning in the human brain foresight, which means thought for the future. No development of any kind could have been made until man looked further ahead than the present; until he saw the need of the future. Then it was that he began to store up for to-morrow the things that had helped to-day.

The crude stone is now his constant companion, but in that form it serves more as a means of defense than to help him increase his food supply.

With an ever-developing brain power, however, the future generations learn to chip that stone better to fit the hand, find out how to sharpen it, and finally to put a shaft on it. Man is now able to use the new weapon to increase his food supply, and so with this move he goes on to the Hunting Stage.

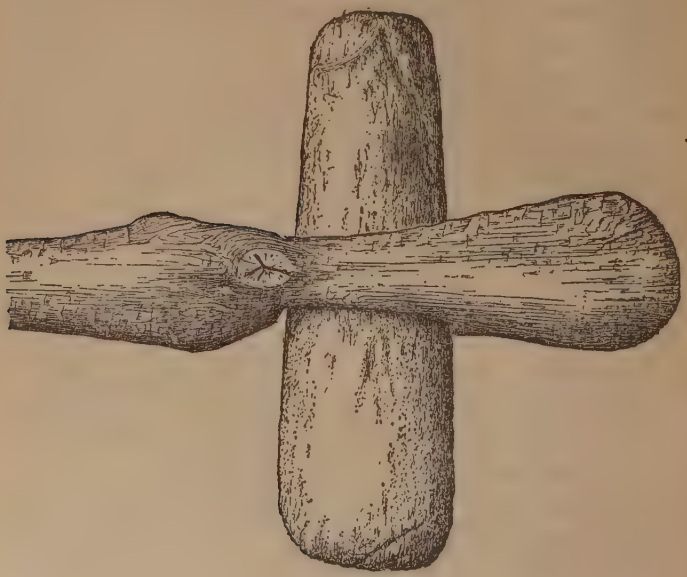


FIG. 61.—A HAFTED CELT

An ingenious stone ax found at Thorndale, New York. The stone is about seven inches long. (Courtesy American Museum of Natural History.)

All his conditions of life are now very much improved. Instead of having to wander over seventy square miles to get a living he needs only fifty square miles. It is very easy to picture his life, for many savage peoples whom we know to-day are living on this stage. Instead of drawing on our imaginations as we were, of necessity, obliged to do in the

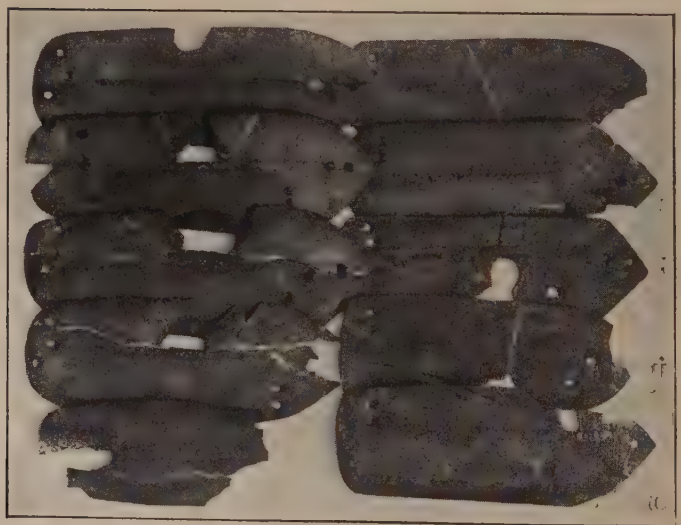
MEXICAN INDIAN WOMAN GRINDING CORN IN THE ANCIENT FASHION

Photo, Mirzaoff

DECORATED MACE

Metropolitan Museum

ANCIENT MACE HEADS FROM EGYPT



Metropolitan Museum

BRONZE SCALES OF ANCIENT EGYPTIAN ARMOR

case of the man on the Collection Stage, let us take a typical group on the Hunting Stage, such as the Australians, and tell the story of their everyday life. Of course every tribe in the world will differ from every other tribe as far as the details of their life are concerned, according as they live on the plains, or in the mountains, in the tropics, or in the cooler regions of the world. To a person who knows anything about this subject of the races, the story of their life conditions is somewhat like a problem in mathematics. Given the environment and the stage of civilization upon which they are, it is possible to work out in great detail much of their culture.

The Australians are typical of the peoples on the Hunting Stage. The part of the country in which they live is very dry, for the rain is scarce. This means that the food supply is not very abundant, so that in order to get a livelihood they must travel from place to place. When they stop for the night, or for a day or two, a little lean-to of boughs is erected in order to afford some slight protection against the broiling sun. As they have no beast of burden except the woman, their household possessions must be reduced to a minimum. They do not have pottery or any vessels for cooking, and clothing is left almost entirely to the imagination, hence the things that must be carried on their journeys are the weapons of the chase. These the women put on their backs so that the men may be free to hunt on the march.

Because these people are on the Hunting Stage it does not mean that they scorn the things that satisfied those on the Collection. They are frequently so hard pressed for food that they will devour with

evident relish snakes, lizards, and grubs of the beetle. Sometimes even these fail them and they then have to resort to roots and bulbs, but they prefer at all times an animal diet. But if conditions are really favorable they hunt the kangaroo, and the emu, which is a bird resembling the ostrich.

The principal weapons that they have are the boomerang, which, when hurled, returns to the

FIG. 62.—BOOMERANGS

(*a*) From Western Australia; (*b*) from Northwest Australia; (*c*) from Queensland.

thrower; and the spear, with a spear thrower to make it go farther. When the Australian starts out on the hunt he is usually armed with both of these, for with the boomerang he hopes to bring down any bird that he may see, and with the spear to kill a kangaroo. When he once discovers the trail of one of these larger animals he will not rest contented until he has brought it down. It may take him several days of patiently following the animal before he comes near enough to strike. But when

he does, he is assured of a good meal, and this is a great event in the life of the man who is constantly in danger of starvation because of the scarcity of food.

He seldom eats his meat raw, but frequently, if he is very hungry, it is only warmed through before he devours it. His method of cooking is ingenious. A hole is dug in the ground and a roaring fire started there. When it is burning well, stones are dropped in and left until they are almost white hot. Then the animal is put in the hole and allowed to remain there until it is cooked.

Under these difficult circumstances the population is small, for the environment will not support many people. A man is allowed by the tribal laws as many wives as he desires, but the average man is satisfied with one or at most two. If more children are born than can be taken care of, the extra ones are put to death, for if they are allowed to live, it means that food will be taken away from other people to support them. Should a misshapen or deformed child be brought into the world, it is killed at once, for everyone must work, and such a child would have to be cared for all its life.

After seeing how difficult the life of these people is, it is not at all surprising that their religion is made up of the worship of animals and of the rain god. All sorts of ceremonies are resorted to in order that the food supply may be increased. They hope that by appealing to the spirits of the animals, the hunting may be better, and they firmly believe that sacrifices of various kinds to the rain god will bring them more abundant moisture.

This, in brief, is the story of the life of a hunting people, which differs only in the details from that

of any other savage group on this stage of development. If, among some other peoples, the environment is more favorable and the food supply more abundant, life will be easier, the population can become larger and the existence more settled. But if, as in the case of the Bushmen of South Africa, there is less food, the civilization will more nearly approach the Collection Stage.

The transition to the Cattle-Raising Stage is as gradual as that from the Collection to the Hunting

FIG. 63.—OBSIDIAN POINTED ARROW

From specimens used by the Shasta Indians. (Courtesy American Museum of Natural History.)

Stage. It comes about through the greater development of foresight. By the time man has advanced far in the Hunting Stage he has made all sorts of clever devices for killing and trapping the animals. He goes out on an expedition and slaughters all that come within range of his weapons. Even those that he captures in his nets he never keeps alive, but kills at once. Finally the same impulse that caused him to keep the stone for use in the future, causes him to take back to his camp some of the smaller animals that fall into his trap. He reasons something like this: "I have more than I want to eat now. Later I may be hungry. I will take these live animals back to camp. I can kill them when I need

them." And so he will lead or drag back the live animal to be used by him for food during a period of scarcity.

There are certain types of animals that he can never treat in this way, for they are both too big and too wild. He soon learns that there are some that will not try to escape, while others can be kept only by fastening their legs strongly together. The chief quality possessed by those that are willing to stay with the savage is an inborn liking for man. This trait has been necessary for domestication from that time to this and because of the lack of it many otherwise useful animals have in no way aided man. The cow, the sheep, the horse, the dog, all like man and are willing that he should be around them, but animals like the lion or tiger tolerate man only because strong cages prevent them from escaping. Another quality that the savage man finds important in those animals which he tries to domesticate is a love of ease. The so-called wild animals are very much happier if they can get their own food, but on the other hand the dog enjoys being fed by man. It is not possible to domesticate animals unless they will breed in captivity, for it is necessary to increase the stock in this way rather than by capturing them all the time. The elephant, as a rule, will not breed outside of its native haunt and for this reason it can never be said to have been domesticated.

One other quality which, as the use of these animals has increased, has proved important, is the ability to keep the breed pure. But this meant little to the early man, for he knew nothing of the breeding of animals in order to get certain desired qualities.

In all probability the first animal to be domesticated by man was the dog. Whether he captured it or whether the animal came to man of its own accord we do not know. If it was the latter, probably man's vanity was somewhat touched by the thought that the animal liked him well enough to follow him around.

Little by little man increases the number and the kind of animals about him. He finds that it makes his life very much easier, for he has a more constant food supply and is not in daily fear of starvation because the hunting fails him. It does not mean that he gives up this occupation, but he does not depend upon the spoils of the chase for his chief sustenance.

By the time that he has advanced well on to the Cattle-Raising Stage and finds himself surrounded by vast herds, his entire mode of life has changed. A smaller area will now support a very much larger population. The fact that the animal's milk can be used for the children means that the number per family can become greater. Before this the children could not be weaned until they were three or four, but now they can be weaned at a few months.

Instead of having to travel rapidly from place to place in search of food, a man and his family can remain in one place as long as the pasturage holds out; and if the herds are not too large, this means a long time. With this more settled life he can begin to collect around him many of the comforts and luxuries.

While the men are out looking after the herds the women remain at home to spin and weave the cloth for clothes. They also carry on the numerous household tasks brought about by the higher stage

of culture. Their life is very much easier than on the Hunting Stage, since they are cared for by the men.

At this period of man's development he has more time to devote to other things besides getting food and fighting his enemies. This leisure he turns to good account and we find that many of the great religions of the world, such as Judaism, Mohammedanism, Buddhism, Hinduism, appear on the Cattle-Raising Stage. To get a more detailed picture of this general type of civilization, one has only to open the Bible and read of the life of the children of Israel. There we find an account of them, wandering with their herds seeking pasturage, and when they have found it, settling down to carry on their domestic life.

The transition to the Agricultural Stage is somewhat more difficult to follow, for, as we showed earlier in the chapter, there are some peoples, such as the American Indians, who passed over the Cattle Stage entirely. This may have been due to the scarcity of animals that readily lent themslves to domestication. Whatever the reason was, we know that the earlier inhabitants of North America did not own any animals, except the dog, until the horse was brought to them by the Spaniards.

In most of our discussion so far, we have tried to make it evident that the man was the chief food getter of the family. He was the one who went out on the hunt and later looked after the cattle. On the Collection Stage, in all probability, the woman played nearly as important a part as man, for there was no camp to look after or property to carry. Then too, there was probably no degree of permanency in the relations between the sexes, so that

the woman was thrown on her own responsibility a good deal of the time.

Even when we reached the Hunting Stage and marriage had come to be more of a permanent institution, the care which the man gave to the woman was often not very great. He would go out hunting, but if he caught only a small animal and his appetite was large, his wife got very little. He might condescend to throw over his shoulder to her a half-eaten leg or some piece that he did not want for himself. If the kill was better, he would finish his meal first and let her take what was left. This treatment probably resulted many times in the woman going to bed hungry. However, we are safe in saying that when the woman found that her lot would ultimately lead to starvation or a condition bordering on it, her natural ingenuity came to her rescue.

While her husband was away in the forest or on the plain she was busy in the neighborhood of the camp collecting roots, berries, and grasses that grew there. By this means she was able to keep up the food supply even when the hunting was poor. The men looked upon vegetables as woman's food, fit only for the weaker sex. However, when the male members of the group came home empty-handed and hungry they were only too glad to partake of the despised meal. The women probably felt an inward joy at the thought that the great hunters had to turn to them for food. It was the first time in their history that their economic importance had been felt. They were adding to the food supply of the group and were, therefore, not to be ignored.

As time advanced they came to learn some things about the fundamental principles of agriculture. It

is very likely that a handful of seeds left outside the hut or cave were seen to sprout and bring forth many more than had been placed there. They observed this, and trying it consciously the next

FIG. 64.—INDIAN WOMAN HOEING CORN

With a somewhat primitive implement she is carrying on one of the ordinary industries of women among her people. (From "Corn in Montana.")

time, found that they had the same success. And so, little by little, they learned from trial and failure until they were able to grow enough to supply themselves and families with this type of food. The men watched this progress with ever-increasing interest, for they saw that the women were getting

a food supply that was more constant than the animals which they themselves were hunting. Gradually the interest took a more tangible form and the men began to help the women in the fields. The ultimate result was that agriculture was taken over almost entirely by the men and the women were again pushed down to a lower economic level.

As soon as a people enter upon the Agricultural Stage their life, of necessity, becomes more settled. They cannot move from place to place and still tend their crops. The whole type of civilization advances very rapidly. More permanent houses are erected, a large amount of personal property that would have been useless in a wandering existence is gathered together. Larger towns grow up, for the environment is able to support more people. All the æsthetic arts such as music, painting, and the drama make great strides forward, as the people now have the necessary leisure to spend in their development.

It was the usual custom for a group to stay in one locality until the land had been pretty well worked out and then move to some spot where the soil was untouched. A good many of the early peoples who practiced agriculture, knew something of fertilizers, a knowledge which, of course, enabled them to stay in one locality longer than they could otherwise have done. The American Indians, for instance, in planting corn would drop a dead fish into each hill, thereby insuring a much larger crop.

As soon as the people began to plant orchards and vineyards their life became even more settled. It was impossible for them to leave the place, as the trees and the vines had to be looked after. In the case of the crops, there was little work after the harvest until the next year, but trees did not begin to

bear for several years. Hence man put up bigger and better houses, for his civilization had reached a high type.

During all this development on the higher stage, hunting and cattle raising were by no means given up, for they added much to the general welfare of man. Better weapons were devised for bringing down larger game and the laws of breeding were studied with the idea of improving the quality of the herds.

Many parts of the civilized world to-day are really on the Agricultural Stage, although manufacturing has so increased and trade routes improved that the products of one district are readily carried to every other. What we now call the Manufacturing Stage is really the sum of all those that have gone before. We are living in an age of high specialization, where the best results are obtained by each section of the country devoting its best energies to the production of those things for which it is preeminently suited. A glance at any one of the civilized countries of the world will illustrate this point. Take the United States, for instance, New England is devoting its energies to manufacturing, the Appalachian region to mining, the middle west to agriculture, the southwest to cattle raising, and the far west to agriculture and forestry. Our whole industrial life has become so complicated that the raw products are shipped into the manufacturing districts and when the form has been changed they are sent back again to supply the wants of the farmers, the miners, and the woodsmen.

The obvious conclusion that the reader has probably reached through this chapter is that civilization has progressed gradually from the simple to the

complex. It did not come into being suddenly as we know it to-day, but, starting from nothing, it advanced step by step as man's vision of the future increased. There were many periods, lasting for thousands of years, when it seemed to be almost at a standstill, when suddenly some event would start it on its upward progress again. And thus it has gone on through countless ages, passing from the Collection Stage through the Hunting, Cattle-Raising, and Agricultural, to the Manufacturing Stage where we find ourselves to-day.

CHAPTER XII

THE DEVELOPMENT OF THE ARTS OF LIFE

WE are surrounded on all sides to-day by material civilization, that is, by tools, weapons, implements, houses, clothes, that aid us in the struggle for existence. But these things have not always been in the form that we now know them, in fact most of them in their early years looked no more like their present form than does a child a few weeks old resemble the grown man. We are dealing here with beginnings, therefore it is important that we know the early stages through which our most important material arts passed in their evolution from the simple to the complex.

Man has been called the tool or weapon-using animal. This does not mean that other animals have not means of defense, but they differ from man in that their weapons are fastened on to their body, while with man they are separate. At first man was the weakest of all the animals and easily became their prey, for he had neither their strength nor speed, and they were keener of sight and scent. The bull with his horns, the lion with his teeth and strength of paw, the snake with his poison were too much for man. In terror he fled up trees and into caves to escape their attacks. But he bided his time until his developing brain gave him the power to defend himself with things external to himself, such

as sticks and stones. While the animals were attacking him he learned much from them, and many of his early arts can be traced directly back to their methods of life. In fact there is scarcely an animal which did not teach early man something useful. "The bears were the first cave-dwellers; the beavers are the old-time lumberers; the foxes excavated the earth before there were men; the squirrels hid away food for the future, and so did many birds, and the last named were also excellent architects and nest-builders; the hawks taught man to catch fish; the spiders and caterpillars to spin; the hornet to make paper, and the crayfish to work in clay." As he advanced on his upward march he took from them their skins, their bones, their teeth, their shells, and turned these things to his own uses. He tamed them and made them carry his burdens, he forced them to use their sight and their scent in hunting for him, so that long before the present time man was master of the beast.

As we saw in the last chapter, probably the first implement used by man was the stone which he picked up to defend himself against the onslaught of an animal. It was rough and unchipped, but it did its work well, and with this as a starter he began to make it more suited to his needs. We have already shown how early man developed these stone implements from the Eolithic period through the Paleolithic down to the Neolithic. But the weapons did not stop there, for with the discovery of such metals as copper, bronze, and iron, man changed the material from which his implements were made, keeping the same general shape. If one compares a modern steel ax with an ancient one of stone it will be readily seen that the former is the lineal descend-

ant of the latter. However, it was possible, with metal, to make weapons for which stone was entirely unsuited. Such things as the long sword, the scythe, and the billhook would have been too fragile if made of stone, but in metal they filled a very important place in the life of the people.

It is very likely that the stick was used by man as a weapon at the same time as the rude stone. He picked it up, as we would to-day, to kill a snake or to drive off some other animal. It could be used both

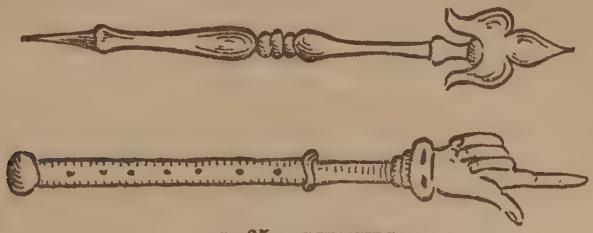


FIG. 65.—SCEPTERS

Used since very ancient times to symbolize power.

as a hurling weapon and held in the hand as a club. When he once learned the value of this latter use he never forgot it, and even down in the Middle Ages we find the club playing an important part in war. Among savage peoples the club has always stood for power, for the man who could wield the biggest stick with the greatest force proclaimed himself chief. If anyone wanted to argue the point with him, it was done in terms of fighting and the victor, by right of might, was the ruler. Since that time the club has stood as the symbol of power, but we find instead of a big wooden affair, a small gold stick called a scepter that is carried by a ruler on state occasions. It is obvious that he does not get his power through his ability to overcome anyone in

a test of strength, but he is granted his rulership on other bases entirely, and his authority is recognized by the gold stick. In the times of the Old Testament if a person wished to speak to the king, he had to wait until the ruler held out the scepter to him, otherwise he would be killed. The gold mace, which is larger than a scepter, is also the symbol of power, and in England it rests on the table during the sitting of Parliament.

It is only a step between the club, which has the striking end larger than the other, and the weapon, similar to the Indian tomahawk, made by fixing a stone on the end of a stick. What man was really doing here was lengthening his arm and strengthening his fist, for the shaft elongates his arm and the stone is practically a hardened fist. Many animals, through their greater length of leg and strength of paw, had been able to strike man first, but by this device man hit the animal before it could strike. This is another example of an idea obtained by man from the beasts.

Among the Australians, one of the favorite weapons and playthings is the boomerang. This is a curved piece of wood that when thrown returns again to the point of departure. It is reported that a skillful man can bring down a bird on the wing at a distance of several hundred paces and have the stick return to his hand. For a novice the weapon is full of danger, as it is likely to hit him on the head when it returns if he is not careful.

One of the early weapons used throughout the world is the spear. At first man took a long straight piece of wood and by means of a stone scraper made it round and smooth. The point was merely the sharpened wood, which later on, was hardened by

fire. In South America there is wood so hard that it is almost like iron, so that the sharpened point is as lasting as stone. But this is only in one part of

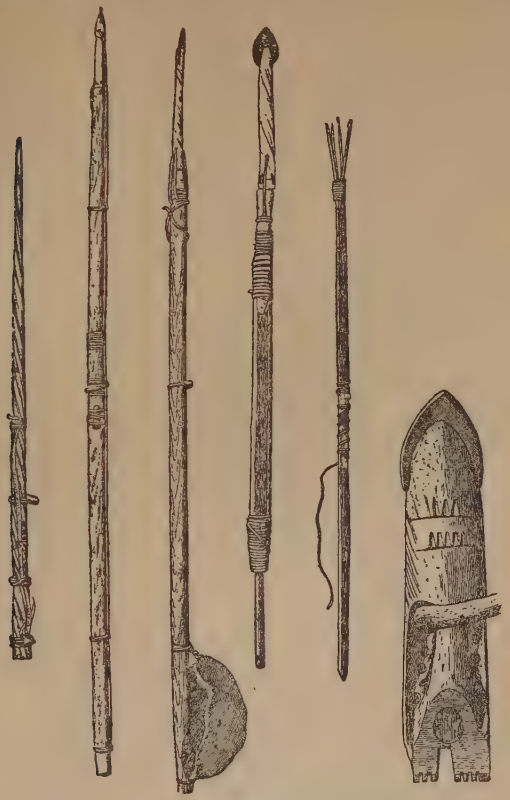


FIG. 66.—WEAPONS OF THE ESKIMO

Spears and harpoons, the latter with detachable heads. One specimen has a bladder attached to the shaft in order to make sure that it will float. At the right is a detached head from a harpoon used in whale hunting. (American Museum of Natural History.)

the world; therefore, in other places heads of stone were used, as the wooden point would break upon hitting any hard substance. These stone points were

straight at first, but as they came out of the wound so easily they were barbed to make their plunge more nearly fatal. The spears were of two kinds, the light and the heavy, the former being used for throwing and the latter for holding in the hand and jabbing into a person or beast.

The Eskimos have a weapon called the harpoon which is a modification of the spear. Wood is very

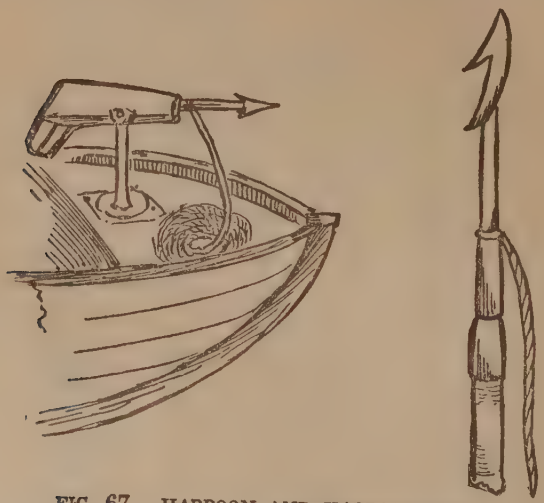


FIG. 67.—HARPOON AND HARPOON GUN

The figure illustrates a modern adaptation of an Eskimo weapon.

scarce, for all they get is that washed up on the shore by the tide. Hence they cannot afford to use it in any way where there is danger of losing it. If they made their spear shafts of wood and the head of bone, of which there is an abundance, and the weapon stuck into a seal which escaped, they would lose their valuable wood. To avoid this difficulty they put on the shaft a detachable head which, when it strikes an animal, breaks off and remains in the

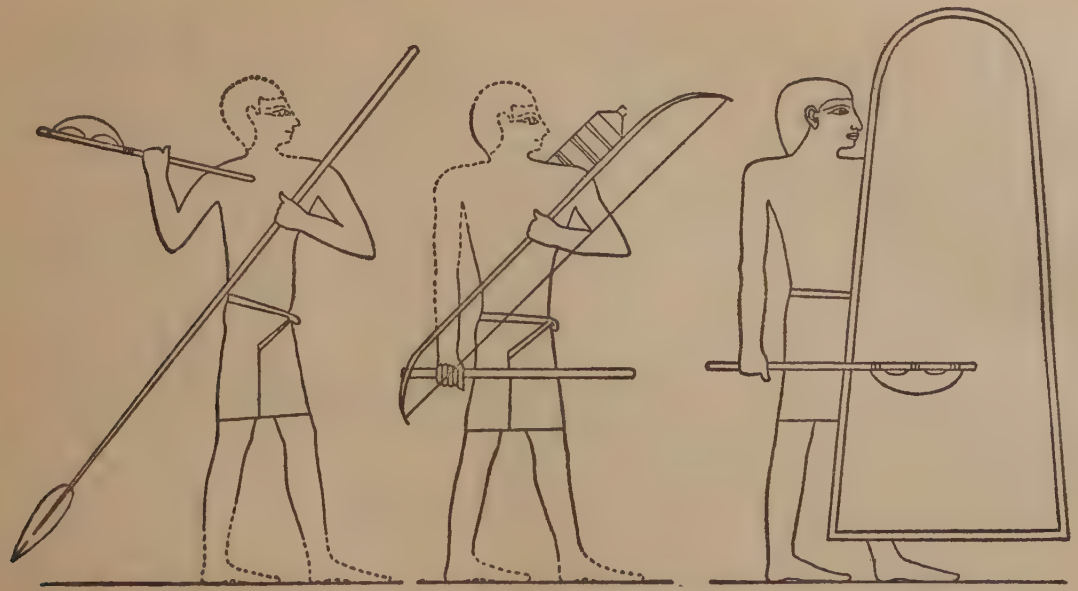


FIG. 68.—ARMED ATTENDANTS TO A MONARCH OF THE MIDDLE KINGDOM, EGYPT (2000 B. C.)

At the left is a servant armed with battle-ax and spear; in the center, one who carries a bow and a short staff and has a quiver over his shoulder; at the right a man with battle-ax and large shield. Here are included weapons that developed almost everywhere: stick, spear, ax, bow and arrow, and the shield for defense.

wound while the wood drops to the ground and can be recovered. When they are hunting on the water they have an inflated bladder attached by thongs to the shaft so that it can easily be seen floating on the water.

Ever since the world began accidents have happened, but they are not always a bad thing, for many

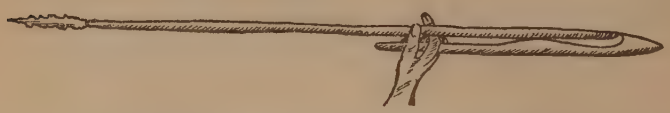


FIG. 69.—AUSTRALIAN SPEAR THROWER

A device to make it possible to hurl the spear farther and straighter. (After Brough Smyth.)

inventions have been made in this world by accident. A broken spear gave man the idea for a dagger. Possibly in a fight, either with an animal or another man, the spear shaft broke, and as a last resort he grabbed the pointed part and found that he could defend himself with it. The next step was to make a longer blade and a shorter handle, and by sharpening both edges there was thus developed a most useful weapon. It is a dagger like this that the Bushmen use against the ostrich when, disguised as one of them, they sneak into a herd of feeding birds.

It is interesting to note in passing how few of the discoveries of savage man were made consciously. That is, he did not sit down as a modern inventor would do and reason things out. Most of his arts he stumbled upon in attempting to do something else. For instance, he might be chipping a stone when a flake would fly off that would be so sharp that he could use it for cutting. He saw how it had

been done and repeated the process. As we go along with the development of these various arts of life this idea will appear many times.

But to return to the spear. In order to give it a greater speed and distance the man began to use a hurling stick or spear thrower. This was a stick from one to three feet long which was notched at one end to fit the spear. It was held in the same hand as the spear and acted like a sling to give greater force to the weapon. Roman soldiers had a thong fastened to the middle of their javelins for the same purpose, but the wooden spear thrower is not found among any of the higher races.

In tracing the evolution of the modern gun we go back to the most primitive weapon ever used by man, the stone. The purpose of a gun is to hit something at a distance and so when the first rock, or even stick, was thrown at an animal the germ of the Winchester had appeared. We have seen the development of this weapon up through the spear, and we are going to attempt to carry it down to modern times. Probably the next weapon of great

FIG. 70.—SOUTH AMERICAN LONG BOW

This weapon is still used by the natives of the interior of South America.

importance to appear was the bow and arrow. Where man got his idea for this we do not know, but it is a possibility that when he saw a young sapling bent down to form a spring trap the thought came to him. The arrow is merely a shortened spear. There is evidence that this weapon appeared

far back in the Stone Age, which is not very surprising, but we do marvel at the fact that up to about a hundred years ago modern peoples were

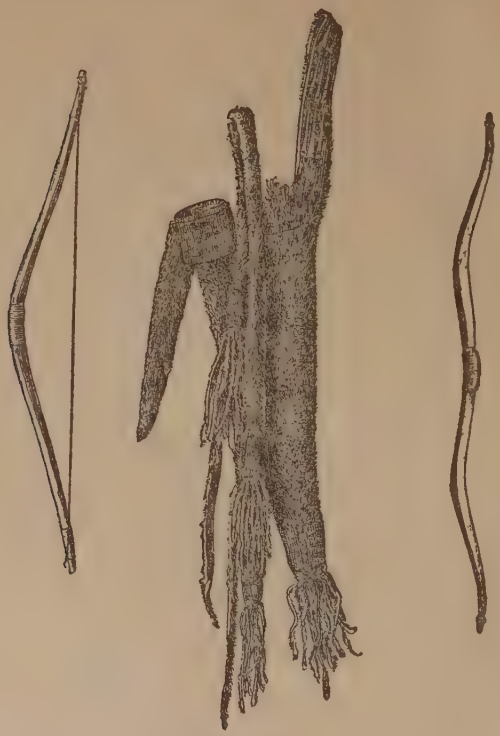


FIG. 71.—INDIAN BOWS AND QUIVER

Two graceful forms of the bows developed by the American Indian. (Courtesy American Museum of Natural History.)

using it. In 1814 Russian Cossacks rode through the streets of Paris armed with this weapon.

The first type, or long bow, as it is called, does not need further description, for every boy has made a bow and arrow from wood and a piece of string.

The bows of the ancients were eight to ten feet long and required enormous strength to pull them back. If one will look at an old medieval picture he will see the archers standing on the castle walls defending the place. Some of them are putting all their

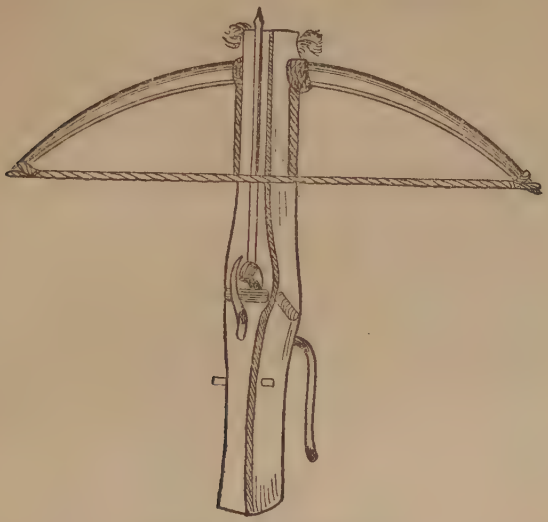


FIG. 72.—A CROSSBOW

A weapon that developed from the bow and arrow to insure sending the arrow to a greater distance. It is a forerunner of the gun.

strength into pulling the string back as far as it will go.

The long bow turned into the crossbow. This was done by mounting it on a stock and putting a catch to hold the string which was then released by a trigger. The arrow fitted into a groove in the stock. The advantage of this crossbow over the old type was that it enabled the archer to take more accurate aim and it did not require such great strength to operate.

Having traced the development of the bow and arrow to the top, or to the point where we see the stock and the trigger of the modern gun appearing, we will leave it there and go on a hunt for the barrel. This we find in the form of the blow gun used by the Indians of Brazil and some of the inhabitants of the islands in the Pacific. It was not a very difficult thing to discover, for a hollow reed was all that was necessary. For missiles they used very small arrows and they became so skillful that they could bring down a bird at 250 feet. As it is the breath that drives the arrow out, the force of percussion is slight, hence to have a deadly effect it is necessary to poison the arrows. Those who are skilled in the use of this weapon can discharge the darts very rapidly. The great advantage lies in the fact that if the victim is not hit the first time, the small arrow falls to the ground unnoticed, and the shooter can continue until he has brought down his prey.

When gunpowder was invented another more powerful force than the human breath had been found to discharge the missile from the blow tube, and when the tube was made of iron and mounted on a stock the first weapon that resembles the modern gun had been made. For a long time all the inventions dealt with methods of setting the powder off, for the loading was always done through the muzzle. At first there was a small hole leading down to the powder into which a live coal or match was placed. It has only been quite recently that this method has been given up in firing the larger cannon. This was, at best, very clumsy for it meant carrying a supply of hot coals on the warpath or on the hunting expedition. The use of flint and steel

in the wheel lock was the next type used. A little rough steel wheel, similar to those used in many of the modern cigar lighters, was revolved by the thumb on a piece of flint and the spark fell into the powder. This same idea was carried farther, with much more success, in the flintlock. For the first

FIG. 73.—THE BLOW GUN

A weapon generally employed for discharging poisoned darts. It is still in use by the Indians of South America. *A* is the outer and *B* the inner tube. *C* represents a quiver of darts and *D* a dart. Here we have in use a tube through which the missile is discharged, as it is with so much greater force in the modern gun.

time the trigger appeared, and it was used to snap the flint on to a piece of steel so that the spark fell into a little powder cup on the outside of the barrel. This connected by a small hole with the powder charge behind the bullet. This, too, had its disadvantages, for if the powder was wet or damp it would not ignite, and oftentimes on the battle field

or at the hunt such a condition must have existed. The small powder caps that replaced the flintlocks were also at a disadvantage in damp weather. These, however, enabled the marksman to do away with the flint and steel, as the hammer came down

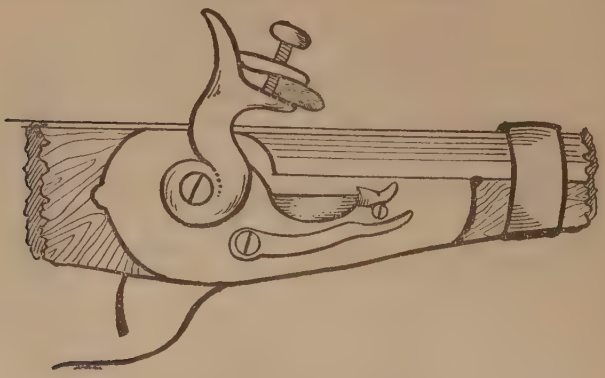


FIG. 74.—FLINTLOCK

This was an improvement on the matchlock that preceded it.

directly on the cap, thus sending the spark into the powder.

So far all the guns were muzzle-loading. When breech-loading was invented, a great time-saving step was taken. Before this, a propelling charge of powder was put in and rammed down, then the bullet was rammed down and finally the retaining wad was forced in. Before the gun could be fired the powder had to be put in the pan or the cap put in place. All this took time, so that when a cartridge was invented which could be inserted in the breech, since this cartridge had not only the bullet, but also the propelling charge and the firing cap in one, the whole character of shooting changed. Rifling the gun barrel, which causes the bullet to revolve and

thus keep steady in its course, is an idea directly descended from the old trick of feathering the arrow for the same purpose.

The spears, the bows and arrows, the guns which we have described, were effective only against animals and people, but where it became necessary to attack a walled town or a moated castle other means of destruction had to be devised. As the most solid implement that the ancients possessed for battering down walls and doors was a big stone, they had to find some means of throwing this with force. If a young sapling is bent to the ground and a stone lightly fastened to the tip, when it is released it will hurl the stone with great force for some distance. The catapult was based on this principle. A long pliable piece of wood was balanced across a log and one end was fastened firmly to the ground. If, after a stone was placed on the other end, this upper end of the wood was forced to the ground and released, it would fly back and hurl the stone some distance. This idea was made use of in various forms and proved a most effective siege weapon in early warfare.

We cannot leave these destructive weapons without a word about the sling. This weapon was devised to enable man to throw a stone further and with greater force than he could possibly do with his arm. It is not improbable that here, too, we can trace the germ of the idea back to the bent sapling. This weapon could not have been devised in such a place as the plains of the Amazon in South America, for there are no stones in the rich loamy soil. Slings are, however, common in the rest of South America and on many of the islands of the Pacific, and we know that in Old Testament times David made good

use of this weapon against Goliath. The old sling consisted of a long thong doubled, at the bend of which the stone was placed. This was rapidly revolved around the head until there was sufficient momentum, when one end of the thong would be loosened while the other was held by the slinger. Practice gave the users of this weapon such skill that they could hit a mark at a great distance.

As man learned methods of killing his fellow men he also found out means of protecting himself from the attacks of those who would end his life. He went to the lower animal world for his ideas, taking their skins and shells. If one will compare the armor of the ancients with the overlapping scales

FIG. 75.—THE ARMADILLO

The overlapping scales of this animal may have suggested to ancient man the idea of overlapping armor plates.

of the armadillo, or the anteater, it will be seen where armor plate originated. The early man covered his own body with these, or took the skin of the crocodile, or the thick hide of some animal for the same purpose. There are other examples in nature of overlapping scales, such as those of the fish or the

pine cone, which probably gave the idea to people to whom the armadillo and the anteater were unknown. Armor increased in importance until gunpowder was invented, after which time it was practically discarded. However, in the World War, the trench helmets were not unlike the shell of a turtle

FIG. 76.—HELMETS WORN IN THE TRENCHES

Even now the forms used suggest in shape the shell of the turtle.

and even some armor was used as a protection against flying shrapnel.

With the introduction of musketry the shield was given up, but at first it was most useful in stopping spears and arrows. For this purpose the Australians use a narrow parrying stick, and they become so skillful that they can deflect an arrow from its course by a sharp side blow. When warfare became a mass affair and not an individual, the large shields held together enabled the men to advance almost as though they had the protection of a moving wall.

We have traced the development of some of the more important weapons used by man in the struggle for existence. We will turn now to some of the other things which show how perfectly all peoples are adapted for the environment in which they are living. The picture that is frequently drawn of

the savage shows him to be a very stupid individual who will sit for hours gazing into space with not a thought in his head. On the contrary, he is very much alive; were we to follow him on his quest for food we would soon realize that we were the stupid ones who knew nothing, while he seemed to possess almost uncanny knowledge. He will crawl silently through the underbrush, watching every twig and branch, for by them he can tell what animals have passed that way. He hides behind trees for hours, imitating the cries of birds and beasts. When these come to answer his call, he shoots them down with his poisoned arrows. The alligator he calls to him by rubbing her rough eggs together on the river bank. By the water hole he will hide, knowing when the animals come to drink, or he will track them through the pathless forest or over the open plain for days, if need be, until he has tired them out and they fall before his arrow. Possibly a whole tribe will start out on a hunt, as the Incas of Peru did, and forming a circle many miles in extent will slowly close in, driving all the animals before them.

It is reported that an Australian hunter will swim under water, breathing through a reed, until he comes to a flock of ducks. One by one he will pull them under by the leg and fasten them to his belt. Along the Nile the ancient Egyptians would swim with their heads in a floating calabash, in order to capture the birds in the same way. In a previous chapter it has been described how the Bushmen kill the ostrich by covering themselves with the body of the bird and then walking unnoticed into a flock of them. We could give innumerable instances to illustrate how carefully the savage has studied his

environment, so that little things, which the untrained person would pass over entirely, tell a whole story. All this painstaking study has developed his sight, hearing, and sense of smell to almost animal keenness. He is able to wander miles from his camp through the trackless jungle, but when the time comes to return, he can go back without the slightest difficulty. And yet we who look down upon the savage man as our inferior would probably starve to death within a few days because we did not know how to get the food with which the forest is filled. It is not at all unlikely that we would die within half a mile of our camp because we could not find our way back.

When man began to tame animals he learned that certain ones could be used to help him in the hunt. Probably the dog was the first of these. We find that in very ancient times both the American Indians and the Australians had trained these pets for that purpose. In India they have used the hunting leopard to kill the deer. This animal is taken out in a cage and, when near the deer, is let loose. After it has killed its prey, before it has had time to eat, the hunters draw it off, put it back in its cage, and give it a leg as its share of the spoil. Hunting with birds was so common in the Middle Ages that the period is usually typified by a picture of a falcon. The birds were taken out with a hood over their eyes, but when the game birds or the rabbits were in sight, the bandage would be removed and the bird let loose. Its gaming instincts were so strong that it would swoop down on its prey, which was then taken away from it. This sport started in the East and gradually spread all over Europe. In China the fishermen have trained the cormorant to work

for them. This bird, with a ring around its throat so that it cannot swallow the fish, sits on the gunwale of the boat peering down into the water. When it sees a fish, the bird dives down and brings it up, but cannot enjoy its meal, since both the ring which binds the throat, and the fishermen who take the

FIG. 77.—GIRAFFE IN A TRAP

At the left is the animal sinking into the trap; at the right is a diagram which makes it fairly clear why it is impossible to escape.

prey away, prevent this. At the end of the day's work, however, the cormorant is rewarded by a few fish heads.

It is reported from Australia that a native will lie very still on a rock with a piece of meat in his outstretched hand. When a bird swoops to get it, the man will grasp him. The Eskimos, in order to catch the polar bear, will take pieces of whalebone, coil them into a spring and freeze them in a piece of meat. This is dropped where the bear will find

it; he comes along and swallows it whole. The heat of the stomach melts the frozen meat, the springs fly out, and tear the lining of the stomach so that the animal dies an agonized death. Pitfalls are very common in parts of the world, especially in jungle regions where the growth of underbrush is rapid. A hole is dug in the ground so deep that an animal cannot climb out of it. The opening is then covered with branches, and in a short time the vines and creepers have entirely concealed the place. The unsuspecting animal falls in and remains there until the hunter arrives. When hunting the elephant in Africa, the hole is made wedge-shaped so that the beast will get his foot caught. Sharp pointed sticks are often placed at the bottom and at times these are poisoned so that the victim, whether he be man or beast, has little chance of life.

On the Congo in Africa a trap is placed in the path of the larger animals such as the hippopotami or elephants. Two stout uprights are driven into the ground on either side of the path leading to the water hole, and across these is fastened another piece of wood. To the middle of this crosspiece is fixed a heavy log of wood with a spear in the lower part. This log is so arranged that when a string, which is across the path, is touched by a passing animal, the heavy log will be released and the spear will transfix the body of the beast. Some time ago a native, while running through the forest, inadvertently touched the string, the spear caught him in the back of the neck, passed through his body and came out between his legs.

One of the common types of traps is made by bending a young sapling down to the ground and fastening to the end an open noose in which bait

is placed. When an animal starts to feed, the tree is released, the noose catches him, and he finds himself dangling many feet off the ground. There are so many modifications of these two types of traps in

FIG. 78.—AN ELEPHANT TRAP

The device by which the largest of animals is killed by natives.

different parts of the world that it is impossible to deal with more of them.

When it is desired to capture an animal alive and uninjured the savages frequently build a stockade which has a long narrow passage leading into it. The natives will form a big circle and drive the animals toward this, and when they have run into the inclosure, as the only means of escape, a heavy

door is dropped across the entrance. This is done for larger game, such as the elephant, but for smaller types, huge nets are hung up into which the animals or birds are driven.

The savage man takes his food where he can find it. Those who live by the sea, the rivers, or the lakes, have devised means of catching the fish. When the streams are narrow two dams are placed some distance apart and then moved slowly toward each other so that all the fish between are caught. Along the shore of tidal water or by a river that frequently floods, stakes with woven brush between, or low walls, are placed at low water. The tide comes in, or the flood rises, bringing with it many fish which are left behind in these traps when the water recedes. Many of the native peoples have developed great dexterity in spearing fish. They have learned by experience how difficult it is for a person to hit anything in the water, owing to the refraction of light. Hence to avoid this the fisherman will lie flat on his canoe with the point of his spear and his eyes under the water. Shooting the fish with the bow and arrow takes an enormous amount of skill, but the natives along the Columbia River add to their store of salmon in this way. The use of fishhooks is not known to all savage peoples living by the water. Those that have this practice make them from shell, bone, and even the claws of birds and beasts. Later when metal was discovered, the same general shapes were adopted.

Poison is a common method used by nearly all uncivilized peoples for bringing death to man and beast. They must have stumbled upon its use by accident, either by observing the fatal bite of the snake or by seeing the way in which the fish were

affected when some poisonous plant fell into the water. In fact water is poisoned to-day by some of the peoples in order to kill the fish. In this connection the question is frequently asked how it is that man can eat fish or flesh that has been killed by poison. There are two answers, either the poison that will kill an animal is so mild that it will have no influence on man, or a poison that will kill when introduced into the blood will have no effect when taken through the stomach.

Most of the poisons are obtained from the juice of a single plant or by a mixture from different plants. Possibly the most deadly of all poisons is made by the people on the Amazon. This substance will kill a small animal at once and it is reported that a man will kill his antagonist by the pressure of his poisoned thumb nail. But even this deadly substance will only act through the blood, where it causes not great pain, but absolute lassitude "like the stopping of a pendulum when the clockwork has run down."

Although poison has been used by individuals within historical times for ridding themselves of some undesirable foe or friend, yet it has not been generally sanctioned by public opinion. The Germans, however, in the World War broke over all traditions by poisoning wells. In the Middle Ages it was not at all uncommon for the dagger used by an assassin to have a poison groove in imitation of the serpent's tooth. In many of the thrilling stories which we have of this period some one is put out of the way by use of the poison carried in a ring. Some years ago there was found in a secret cabinet in the wall of a chateau in France many bottles of poisons used by one of the mistresses

of a king for putting to death those suitors who knew too much.

We come now to a discussion of fire and the part that it has played in the development of civilization. Few of us realize as we sit in front of a big wood fire on a cold winter evening that this one element has done more for progress than any other one thing. If it had not been for fire we probably would not be living in this part of the world to-day, indeed, it is very doubtful if the stage of culture would have risen much above that of the savage. In the first place, fire gives us the warmth necessary to live in a climate for which our bodies are unsuited. We are creatures of a warm region. By heating our houses in winter we are creating an artificial climatic zone. Fire is necessary to cook food. By cooking we break down the cells and soften the tissues so as to make food easier to chew and digest. Of course raw meat and vegetables can be eaten by man, but in this case the stomach has to do the work of the fire. So much energy is exhausted in the process that after each big meal a man is obliged to sleep for three or four hours. This means that most of his time is taken up with the getting and the digesting of food, hence little civilization except that connected with the simple means of self-maintenance can develop. Fire is necessary for the smelting of metals. If it had not been for these we would still be back in the Stone Age where fire was used only for cooking, warmth, and the scaring of wild beasts. And last of all the wheels of modern industry would almost stop if it were not for this great propelling force.

Man is the only one of the animals that can generate fire. Moreover, while many of them enjoy its

warmth after it has been made, yet none of them know enough to add fuel in order to keep it burning. There are no people in the world to-day who do not possess it, but there are some who are unable to make it, so that, if for any reason it goes out, they are obliged to travel to a neighboring camp in order to bring back a firebrand.

From which natural source man obtained fire at first we do not know, but in all probability he was using it a long time before he knew how to create it. The outlet to the central fire of the earth is through the volcanoes. But it is doubtful whether the primitive man who saw the top of a neighboring mountain blown off, and the great stream of molten lava flowing down, would stop very long to investigate. However, we know that these lava streams stay hot, sometimes for twenty years, and so, long after the fear had left him he might return and experience the enjoyment of the warmth on a cool night. While a savage fears thunderstorms, yet they are of such frequent occurrence that he gets used to them. The lightning must have started many fires, so that possibly he obtained the great boon in this way. Fires have been ignited in the woods by the rubbing of two dried branches together in the wind, and even spontaneous combustion in a big pile of leaves or other vegetable matter may have started the eternal spark.

There are numerous ways in which man may have discovered how to generate fire, but it is very doubtful if he sat down and reasoned it out. In boring a hole through a piece of wood the heat produced may have suggested a method to him. It is even possible that the wood dust thus created took fire and so taught him the process. Most of the savage

peoples start a fire to-day by rubbing wood on wood, although the exact method varies in different parts of the world. Possibly the simplest form is used by the Polynesians, who push a stick along a groove of its own making in a block of wood. At one end

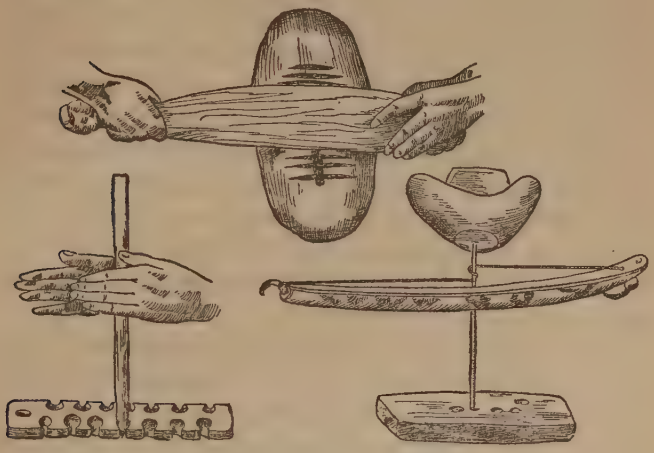


FIG. 79.—FIRE MAKING

In the methods illustrated, it is always wood on wood that is used. Above, sawing with a spear thrower on a wooden shield. Left, twirling a stick on a hearth devised for the purpose. Right, the bow drill and hearth.

of the groove is piled such tinder as dried grass, moss, or bark, that soon ignites from the spark in the wood dust.

The fire drill is a shaft with a blunt end, revolved by the hands on a flat piece of wood. The combination of the rapid movement and the great vertical pressure soon causes the tinder to ignite. A similar process is carried out by winding a thong about the stick and pulling it back and forth or by using a bow in the same way. The pump drill consists of a pointed stick with a circular weight at the lower

end. A very loose bowstring is fastened at the top and wound around the stick. To work it, the bow is pumped up and down, thus causing the string to wind and unwind and the stick to revolve first one way and then the reverse. Flint and steel came into use in early historical times and remained even into the colonial period of this country, where every farmhouse had its tinder box for starting the fire. The use of the burning lens and the concave mirror have never become general although a tradition of ancient history tells us of the destruction of the fleet before Carthage by concentrating on the ships the rays from huge mirrors set up on the walls of the city. The match was invented in 1827 and since that time has gradually superseded all other means of creating fire.

Cooking food was an art practiced long before historic times, and there are no tribes on the earth to-day who do not cook their food some of the time. The origin of cooking is lost, together with the beginnings of so many of the other arts, but we are pretty safe in saying that it was an accidental discovery. Possibly after some forest fire the primitive man came upon the burnt body of an animal. His curiosity got the better of him, he wanted to see why it looked so queer and he touched it with his finger. As the body was still hot he burnt himself, and so, according to Charles Lamb, he did the logical thing to cool his finger—put it in his mouth. The taste was good and to his liking. Thus, when the beast cooled a little, he sat down to his first feast of cooked meat. The memory of it remained in his mind for a long time and he knew enough about cause and effect to realize that the fire had something to do with the pleasant taste of the animal.

Of course, this more or less fantastic picture may be all wrong, and man may have used fire for warmth and scaring the wild beasts long before he began to use it for cooking. We do know, however, that the first cooking was done by merely throwing the animal into the hot embers and leaving it there until it was at least warmed through. Another form of cooking, namely, of putting the meat on a stick and revolving it in front of a fire, can still be found to-day in the peasant houses of Europe where there is no cook stove. It was only a few years ago in the farmhouses of this country that one could go into the kitchen, with its roaring open fire, and find the meat cooking in this way.

Most of the savages know how to bake their food. A hole is dug in the ground and a big wood fire started there. After it has burned down to the embers, the food is wrapped in leaves, put in, and covered over with grass and dirt. It is left there until it is ready. The Australians will take a bird, plaster it over with clay, and put it in such an oven. When it is done the baked clay is broken and the bird, which has been cooked to a turn, removed.

The last method of cooking to be discovered was boiling. The Australians know nothing of it now and the ancient Greeks did not know its use in preparing their food. Where it is used, the direct application of the fire is not common. The usual method is to dig a hole in the ground, line it with an animal skin, fill it with water and drop in hot stones. When the water is boiling the meat is put in and covered over. When pottery and large wooden vessels came into use the hot-stone method was still continued for a long time until the direct application of fire was discovered.

This element has always been closely connected with religion, for it was thought to have the ability to cleanse and to drive away evil spirits. It was not so many years ago in Europe that during a cattle plague the beasts were driven through a fire, with the hope that the disease might be expelled. Those who have sat around a camp fire at night in the woods and watched the shadows come and go among the trees, can appreciate the feelings of the savage man who grabs a burning brand from the fire and rushes into the woods to scare away these dancing spirits. To him they seem to flee before the advancing light and he returns confident that he has driven them away. A dog lying by the fire will suddenly run to the edge of the clearing and bark out into the semidarkness. This animal is also supposed to see spirits and only confirms the idea that is firmly planted in the mind of his master.

Ever since these early days fire has played an important part in the religions of the world. In Rome the Vestal Virgins guarded the fire in the temple which was never supposed to go out. If by any chance it was extinguished, it was not rekindled by flint and steel, but by the more ancient and therefore the more sacred method of rubbing wood on wood. When Christianity took the place of paganism this one custom passed over, so that at Easter all the fires in Rome were extinguished and then they were rekindled in the churches by the old method. The people came from all around to get some of the sacred fire to use in relighting the one which they had put out.

CHAPTER XIII

THE DEVELOPMENT OF THE ARTS OF LIFE—*Continued*

AS we saw in the chapter on Self-Maintenance, while the savage men are out hunting and fishing, the women are tending the camp and collecting what agricultural products they can from the vicinity. In order to pluck and gather the berries, the fruit and the grasses, they do not need any other implements than their hands or a stone to throw. They are much like the child of to-day in this, who will pick up the nearest stick or stone to hurl at the apples on the top of the tree. When, however, they began to dig the roots they needed something to supplement their fingers, and so they took the nearest stick at hand for this purpose. The Australian woman has a short digging stick which she always carries with her, and she uses it not only for the purpose for which it is intended, but also for driving away any man who comes closer than she cares to have him. The sharp stick probably suggested the use of the spear for digging, and this was followed by a flat paddle which was not unlike the present spade.

When agriculture came to be an important means of livelihood, and an implement for hoeing was needed, a branch, with a point at right angles to the handle, was used. This, through a slow evolutionary process, developed into the modern plow. They first used it as we do a hoe, then, as it became

heavier, they put a handle on it so that it could be dragged through the ground, making a crude furrow. The next move was to put two handles, so that one man could guide it, and a shaft, so that it could be drawn by two men or an animal.

FIG. 80.—FOOT PLOW

A primitive plow used by the Indians of Peru.

The wooden share was changed to one of iron when this metal came into use. The hoe, by means of which men formerly broke up the clods, was turned into a plow by the addition of a pole and some rope. We have to-day the steam plow that is able to prepare acres of land in a short time, but even in the most modern of inventions we can see the remnant of the wooden hoe dragged through the ground by the savage men.

As long as man was eating fruits, berries, and nuts he had no need for a mill, but when he started to eat the grass seeds or grains he had to have some way of separating the eatable from the noneatable parts. Here nature was good to him, for she provided him with a mill already made that in its action was not unlike the modern grist mill. We refer to the human teeth, that were able to grind the grain and thus separate the wheat from the chaff. This method was, of course, convenient for the person owning the teeth, but the milling process did not help the rest of the community very much. In all probability the woman was the one who invented the first external form of mill. She would take the grain, put it on a flat stone and rub another stone, that fitted her hand, across this. After this process had been carried on for some time in the same place the lower stone would begin to wear away, leaving a

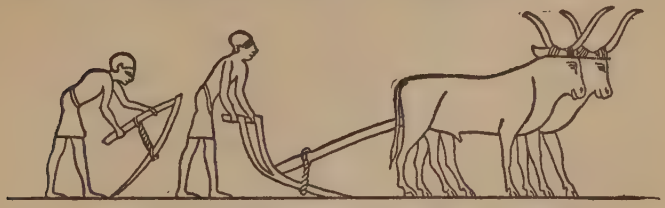


FIG. 81.—ANCIENT PLOW DRAWN BY OXEN

The use of draft animals added greatly to the effectiveness of these agricultural implements. (After Tylor.)

hollow. This was more of an advantage than a disadvantage, for the grain, instead of spreading all over the rock, was now confined to a small space.

The teeth of many of the grain-eating people are worn almost down to the level of the gums. This fact has been attributed to the large amount of

pulverized stone that remains in the grain, because of this method of grinding.

When the primitive people saw how advantageous the hollowed lower stone was in the preparation of the flour, instead of waiting for this to be worn down by the slow grinding process, they cut it out beforehand. This hole must have been round or

FIG. 82.—STONE PESTLES

These were used without a mortar by the American Indians. (Smithsonian Institution.)

nearly so, for it would be very difficult to revolve a stone in one of any other shape.

Developing at about the same time, and in the same way, was the mortar and pestle. This was used for pounding instead of grinding the grain, as well as the stone needed in making paint. Go into any drug store to-day and there will be found on the back counter a mortar and pestle not very different from those used by the savage tribes.

In some of the country districts of Pennsylvania the old "Hominy Block" is still to be found. This was made by hollowing out the stump of a tree and

then fastening a large wooden pounder to the top of a near-by sapling. When it was used the farmer bent down the sapling so that the grain could be pounded by the wooden pestle. The spring in the young tree helped to pull this up after it had been brought down each time.

The next step in the growth of the mill was to make the upper stone round so that it would just fit into the lower one. A handle was put on in order to turn it more easily. As this stone became larger it became more awkward to handle, for it had to be lifted out to remove the grain. To obviate this difficulty the lower stone was also made round and flat and the two were held together by a loose wooden pin going down through the center of each. Another hole was made near the middle of the top one, to drop the grain down and at one side was a handle for turning. Where both the inner surfaces were smooth, the tendency was for the grain to stay between the stones without working its way out to the edge. This difficulty was partially overcome by cutting in the stones small grooves that radiated from the center. The movement of the flour to the outer edge was still further assisted by beveling both stones on their inner surfaces. In the modern flour mill, stones have been replaced by rapidly revolving porcelain rollers that crush the grain to fine flour.

The first power used to run the mills was female power, for the women were the ones who did all the work in connection with the preparation of food. The invention of the treadmill, whereon slaves and domestic animals walked innumerable miles without getting anywhere, relieved the women of this arduous task. The use of this mill, however,

was not widespread, and so in most parts of the world the women continued to do the work. The discovery of the use of water to drive machinery was probably made in Egypt. There the water was

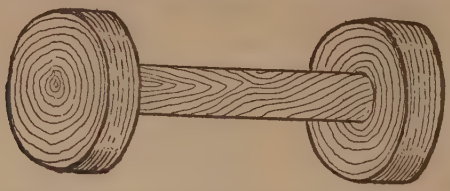


FIG. 83.—WHEELS AND AXLE MADE FROM A LOG

These solid wheels of wood were probably the first form used.

raised from the Nile to irrigate the fields by means of a wheel with buckets on the rim, placed in the stream. Some one, whose name has been lost in antiquity, saw the great amount of power that was

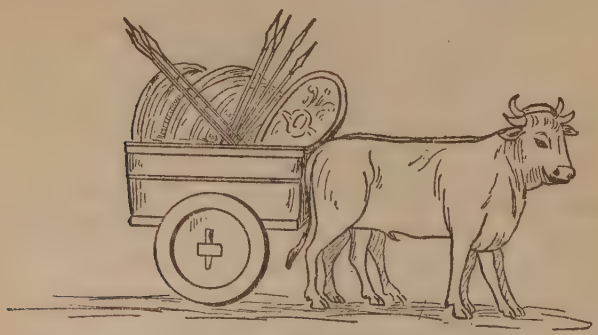


FIG. 84.—ANCIENT BULLOCK WAGON

In this drawing, taken from the Antonine Column, the wheel is still solid, but has been improved. (After Tylor.)

going to waste in this wheel and harnessed it to turn his mill. No one will ever be able to count the millions of hours of human time and the number of aching backs and legs that this invention has

spared. One of the Greek writers said: "Cease your work, ye maids who labored at the mills, sleep and let the birds sing to the returning dawn, for Demeter has bidden the water nymphs to do your task; obedient to her call, they throw themselves on the wheel and turn the axle and the heavy mill." Wind, coal, and oil followed the water wheel as sources of power not only for grinding the grain, but also for turning the wheels of all our modern industries.

Turning now to the development of transportation, we find that man was first his own beast of burden,

FIG. 85.—WOODEN WHEEL CUT OUT

Here a rude wooden wheel has been partly cut out to reduce the weight and make it less clumsy.

or we can probably say with a good deal more truth, that woman was man's first beast of burden, for she was the one who carried all the things when the camp was shifted. Where he obtained his idea for the wheeled cart, we do not know, but in all probability he stumbled upon it by accident. Possibly in dragging a log down to the water's edge a small roller got under it and the man saw how much easier it went. He then, of his own accord, put

round pieces of wood down and hauled his logs over those. The first wheels were made by cutting the ends off a round log, but they were nearly a foot thick. The axle was fastened to them so that it revolved with the wheels in rings on the bottom of the

FIG. 86.—WAR CHARIOT OF THOTHMES IV, WITH SPOKED WHEEL

Thothmes IV was an Egyptian monarch of the Eighteenth Dynasty (1426-1411 B. C.). The drawing is from the ornamental relief on his war chariot, found in his tomb in the Valley of the Kings and now in the museum at Cairo, Egypt. The king stands in his chariot and shoots an arrow, guiding the horses by the reins tied around his body. He wears a leather gauntlet on his left forearm and a helmet on his head, and carries two quivers over his shoulder. At the side of the chariot are another quiver and a bow case. (Metropolitan Museum.)

cart. This idea probably came from taking a log and cutting it down in the middle, leaving both ends as they were.

Most of the later steps in wheel-making were carried out with the idea of reducing weight and friction.

The wheel was made thinner and was put on so that the axle did not revolve with it. It was found possible to cut out several segments of wood from the wheel so as to lighten it still further. From this the idea was obtained for constructing the wheel with the tire, spokes and hub. A further advance in this same direction was made when rubber tires were substituted for those of metal, and when ball

FIG. 87.—PREPARING FLAX FOR SPINNING

The pictures in this series and the next were made from wall paintings in the tomb of Daga at Thebes, Egypt (Eleventh Dynasty, about 2160-2000 B. C.). The first woman is cleaning flax between two sticks; the second draws out a continuous rove from a pile of rough fiber and lays it in a coil behind her; the third loosens the fiber to prepare it for spinning. (Metropolitan Museum.)

bearings were put in to aid in the elimination of friction.

Where or how early man learned to spin and weave, we do not know, but it "happened before the footlights were turned on and the curtain rose on the great human drama." The most ancient of the Egyptian mummies were wrapped in finely woven linen and long before that we find remains of implements that show us that the people knew these two arts. In the islands of the South Seas the people to-day take grass and plait it into mats to be used for dress or to cover and decorate their houses. But here the grass takes the place of thread and does

not need any further preparation. The first thread was made by twisting vegetable fiber or hair between the hands or on the thigh with one hand. Civilization was well advanced before the mechanical spindle aided the workers in this tedious process. There are paintings on the Egyptian tombs that show, probably, the first form of the later spinning

FIG. 88.—SPINNING FLAX, ABOUT 2100 B. C.

The woman at the left has a pile of flax in front of her, from which she draws fiber, loosely twists it on her knee and lays it in a coil behind her. The woman at the right is spinning the prepared flax with two free spindles, twirling one on her thigh while the other whirls in the air. The thread has already been prepared and placed in a bucket to moisten.

wheel. A piece of wood, resembling a fish reel, was fastened to one end of the thread and then revolved rapidly in the air. This twisted the thread more evenly than could be done by hand. These spindles, as they were called, were later put into the spinning wheel that found a place in nearly every house in this country during colonial times.

Weaving was done by stretching a number of these threads on a frame to form the warp, then in and out between these, other threads, known as the woof, were worked. This process was very slow at

first, for the warp had to be lifted by the fingers, but the difficulty was overcome by putting every other thread of the warp through a crossbar that

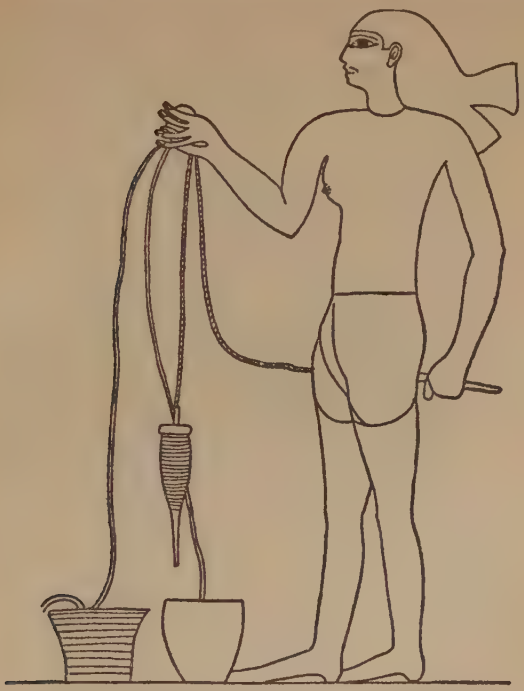


FIG. 89.—SPINNING WITH TWO SPINDLES

Drawn from a wall painting in the tomb of Khnumhotep at Beni Hasan, Egypt, about 2000 B. C. Loosely twisted thread is fastened to the top of the spindle, which is then twirled in the hand and dropped, still gyrating. The finished thread is wound on the spindle below the whorl and the action is repeated. The two spindles are used alternately.

could be raised or depressed as the shuttle, carrying the woof threads, was passed from side to side. This simple form of loom was mounted on a frame and the warp fastened to rollers so that the cloth could be wound up as made. The shuttle, which before

had been laboriously pushed from side to side, was now arranged so that a sort of hammer hit it and threw it across. The pressure of the foot on a lever caused this hammer to move.

Up to the middle of the eighteenth century in England all the spinning and weaving was done in the homes of the people. One weaver could use all

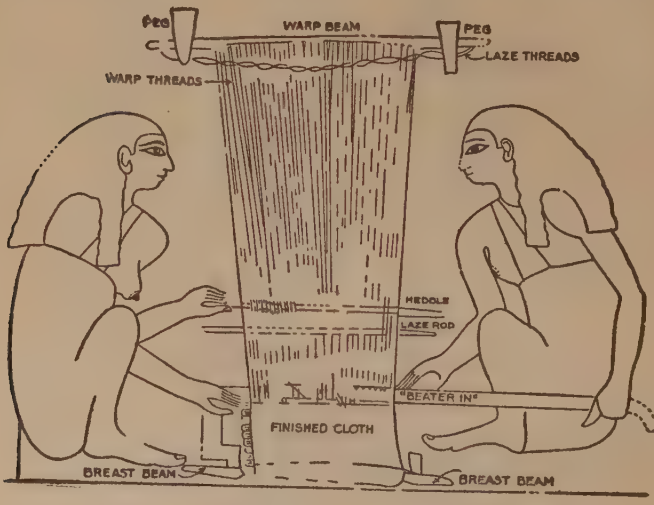


FIG. 90.—WEAVING ON AN EGYPTIAN LOOM

From the tomb of Khnumhotep at Beni Hasan. The woman at the left inserts the heddle to separate the warp for passage of the shuttle that carries the woof, while with the other hand she helps her companion with the "beater in." (Metropolitan Museum.)

the threads supplied by several spinners. In 1764 Hargreaves invented a spinning jenny that enabled one worker to produce eight threads at once instead of a single one. This meant that there was an overproduction of thread. In 1785 Cartwright invented a power loom which enabled the weaver to work faster. Finally the machinery became so large that

it needed water instead of human power, and so it was taken from the home and put into a factory.

FIG. 91.—A NAVAJO WEAVER

These Indians knew the art of weaving and practiced it skillfully long before the whites came.

Early in the history of civilization man found the need for having vessels of one sort or another in which to put things. In order to keep any liquid or to carry it from the brook to his camp some non-

leakable receptacle was necessary. Nature supplied him with coconut shells and gourds that answered his purpose well. In places the warriors would take the top of the skull of a fallen foe, cover it with clay to prevent it from leaking and use it for drinking. The usual baskets that were woven from grasses and twigs for carrying and storing grain were of no value for holding liquid, although certain of the Indians were able to weave so finely

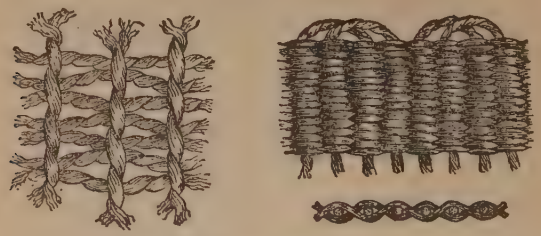


FIG. 92.—WEAVING BY THE MOUND BUILDERS

Two of many varieties of weaving found among the remains of the North American Mound Builders. At the left, a twisted weaving; at the right, a variety of in-and-out weaving. (Smithsonian Institution.)

that their baskets would hold water. To overcome this difficulty some one thought of the brilliant idea of covering the outside with clay. The resulting implement not only enabled them to carry water but was also valuable in cooking. In time the basket work would be burned away, thus leaving a clay vessel. Many of the bits of pottery that have been found show the imprint of basketry, and so we are probably safe in assuming that the use of clay in the making of vessels originated in this way.

When man began to make pottery apart from the baskets it was probably done by a building-up process. That is, he would take round pieces of clay, about the size of a pencil, and coil them one upon

the other, and press them together with his fingers. After the rough form had been built up, one hand on the inside and one on the outside would smooth

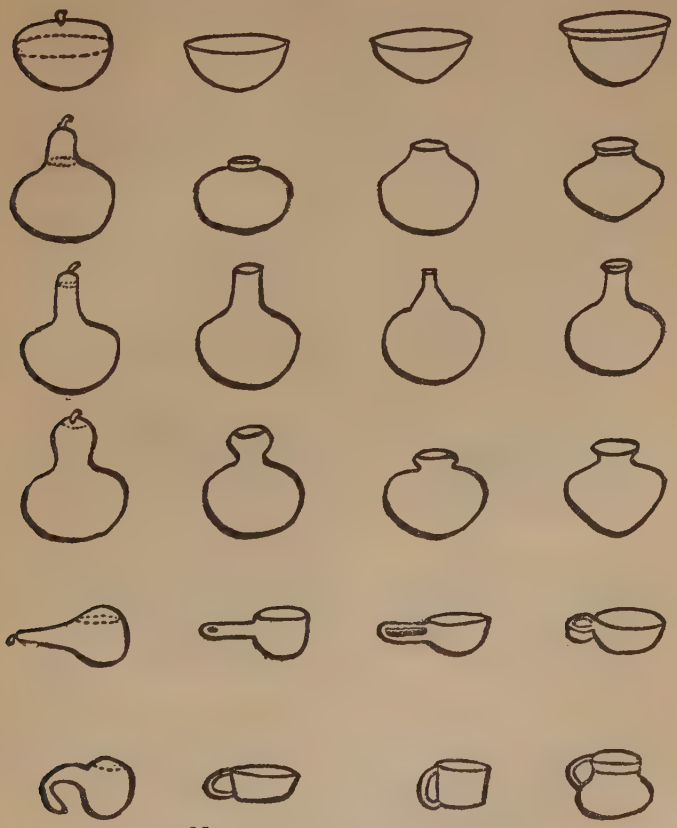


FIG. 93.—PUEBLO FORMS OF POTTERY

A series to illustrate the evolution of Pueblo forms of pottery from indigenous gourds. (After Holmes.)

down all the wrinkles. The early Egyptians knew the use of the potter's wheel. This was a heavy round piece of wood that could revolve on a pivot.

A piece of clay would be placed in the center, the wheel revolved, and the potter with his hands would, out of the shapeless mass, turn out a vase or dish of almost any shape. Methods have not changed much in all these centuries, for in the modern factory the potter's wheel still holds sway, but instead of being driven by hands or feet it is revolved by the power of steam or electricity. In order to make the vessel keep its shape it was baked, at first in the ashes of a camp fire, but now in especially constructed furnaces. As first made, pottery is porous, but different peoples have used various means of glazing it to make it water-tight.

Pottery was at first used undecorated, for the people cared only for its usefulness and not its

FIG. 94.—INDIAN POTTERY

At the left is a vase made by the Iroquois Indians. At the right is an illustration of the method employed by the Zuni Indians in making pottery without a wheel, building up the form of the vase by coiling the clay.

beauty. Later, however, the people began to paint it either with the figures of men and animals or with geometric designs. It is an interesting fact that where lines are used they are always symmetrical—that is, they are not put on just hit or miss, but in

regular patterns. This can be traced to the fact that the idea of symmetry is inborn in man. Everything about his physical make-up is regular. His heart beats in rhythm, he walks and breathes in

FIG. 95.—MAKING POTTERY FOUR THOUSAND YEARS AGO

The potter's wheel is an early invention that is still in use. This picture, drawn from a wall painting in the tomb of Khnumhotep at Beni Hasan, Egypt, was probably made about 2000 B. C. At the right, a man is shaping a vase and turning it on the potter's wheel; at the left is an oven on which pots are baked; above are finished pots and vases of various shapes. (Metropolitan Museum.)

rhythm, he has two legs, two eyes, two ears; his nose and mouth are centered. Hence regularity, rhythm, symmetry, are as much a part of him as the light is of the sun or the tides of the sea.

Much of the knowledge that we have of the history of the ancient Greeks and Etruscans comes to us from their vase decorations. They have left for us pictures of their methods of spinning, weaving and other household tasks; of agriculture, hunting and of war.

The all-absorbing topic to-day for at least 50 per cent of the population is clothes, but it has not always been so. Time was when the population lived unadorned and unashamed of the bodies which nature had given them. Nearly all of the savage peoples to-day living in the tropics are more or less in this condition, although few of the older members of the communities are entirely without some covering or decoration. But why and when did people get away from the time when clothes were left entirely to the imagination? Certainly, they were not worn at first for warmth, for the heat of the tropics would preclude the need of this. How, then,

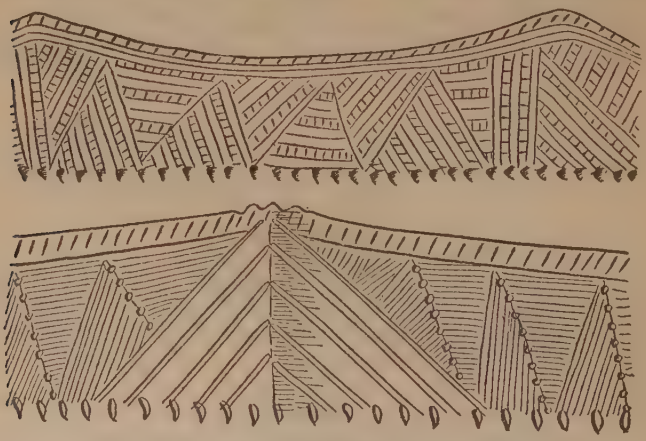


FIG. 96.—INDIAN POTTERY DECORATIONS

Even the simplest designs show appreciation of symmetry. (American Museum of Natural History.)

did they originate? The mind of the primitive man was as the mind of a civilized child. He liked to collect pretty stones and shells and bright feathers, for their beauty appealed to him. However, when he was moving from place to place he could not

carry them in his hands, for he had to have his weapons with him, and if he left them in camp some envious person might take them. Hence the only thing to do was to hang them on his body. His neck and his waist were the only two places where

FIG. 97.—GREEK VASE

Possibly the highest form of art in shaping and decorating pottery.

they would be out of his way and so he strung them there. If he hung them in back he could not see them, and so he hung them in front. Thus it was vanity, not modesty, that caused man to clothe himself.

It was not long before others began to hang ornaments on their bodies, for these were the things that primitive man considered as wealth. No person wanted to be regarded as poor, and a lack of such adornments would have put him in that class. This feeling is as strong in the human race as ever.

If Mrs. X and Mrs. Y both have boxes at the opera, and Mrs. X has a diamond necklace, Mrs. Y, not to be outdone, if she cannot afford a real one, will get one of paste.

It did not take very long for the wearing of ornaments to become the custom, so that if persons appeared without them they were considered immodest. There is nothing indecent about the human body except as custom makes it so. Among some of the savages, if women cover the upper part of the body they are modest, even though they have nothing else on. But among the majority, some sort of ornaments or grasses or mats hung from the waist constitute the necessary amount of clothing. If a woman in America were to appear on the streets without shoes or stockings she would be thought to be immodest. In Turkey, if the lower part of her face and her hair showed, although the rest of her body might be very scantily clad, she would be put in the same class. Even within a country a thing that at one time and place is considered correct at another time and place would be thought most disgraceful. For instance, a man and girl can sit together on the sand by the sea in bathing suits and it is not improper, but let them appear in the same costumes at a dance and the world would be shocked. Even let them walk down a street in New York in such a costume and they would be arrested for indecent exposure. In certain of the South Sea Islands a woman with red lips is considered almost immoral, while in neighboring islands a woman who does not blacken her teeth is regarded in the same way. In China a woman is thought to be immodest if she shows her artificially distorted foot to a man, and it is even

considered indecent to mention it. The old idea that modesty arose first in the female sex is entirely wrong, for there are certain tribes where the males alone wear clothes. This all illustrates the fact that there is no universal idea of modesty or that certain parts of the body should always be covered. It can

FIG 98.—HAIRDRESSING FOUR THOUSAND YEARS AGO

An Egyptian lady is having her hair arranged. In one hand she holds a hand mirror, probably of burnished metal, while she drinks from a cup brought by an attendant. The maid has pinned up some of the upper locks to keep them out of the way while she arranges those below. The drawing is made from a relief on a sarcophagus of the Eleventh Dynasty. (Metropolitan Museum.)

be carried back in nearly every case to one of the great socializing forces—vanity.

Painting the body with bright colors was found to please the same artistic sense, and it was as widespread as any other single custom. But some of the tropical peoples found that it had a practical value. The grease and bright-colored mud with which the whole body was covered was found to keep off the

bugs and insects. There are some African tribes that start plastering the children in this fashion as soon as they are born and, as they seldom take a bath from the cradle to the grave, it is reported that they have a regular rind over the whole body. Unlucky is the day for these people when they fall into a stream or are caught out in a heavy rain, for they get a much-needed but a greatly undesired bath.

During the time of great festivities the paint was lavishly applied in all the colors of the rainbow. Patterns of different sorts, including tribal marks, were carefully worked out, and some savages to-day will spend hours preparing themselves for their feasts. Sorrow, too, will cause them to cover their bodies with white or black paint. The American Indians on the warpath thought to strike horror into their enemies by painting their faces in all sorts of lurid colors, and Cæsar reports that the ancient Britons stained themselves blue for the same reason. The modern woman who paints her face to-day is either very savage or the savage was very modern, born years before his time, as it were. It is true that paint will hide many disagreeable blemishes such as age, and many a woman of advanced years tries by paint and powder to retain the flush of youth. At times she makes herself as radiantly beautiful as the Indian on the warpath, and while one desires to repel and the other attract, they both succeed in doing the former.

The first actual clothes that were worn were probably made from skins of animals or from grasses and leaves. In Brazil there is a tree whose bark is taken and used for a shirt, and so the tree has come to be known as the shirt tree. The Polynesians take the bark of the paper mulberry and by

beating several layers together when they are wet prepare a most excellent cloth that is used in making their clothes and houses. When these natives were first given paper, by the whites, they thought that they had a very fine quality of bark cloth, but the first shower in which they wore it convinced

FIG. 99.—TATTOOING
Maori of New Zealand.

them of their error. We know that the early cave dwellers of Europe wore the skins of animals, for they have left for us the stone scrapers that they used in preparing them, and the bone pins by which the garments were fastened.

There are many peoples in the world who are not content to paint the body and to decorate it with ornaments. They feel that they must mutilate it in some way in order to be truly beautiful. The forms of mutilation that are the most widespread are scarring and tattooing. The Australians and certain of the African tribes will make deep incisions in the

skin and fill these with ashes and dirt. When the wound heals they may have a scar that is from a half to three-quarters of an inch high. These marks indicate either that a person belongs to a certain

FIG. 100.—JAPANESE TATTOOING

Beautifying by elaborate pictures.

tribe or that he has done some extraordinary act of bravery. In tattooing, the patterns range from a few lines of geometric designs on the arms and chest, down to the elaborate pictures that cover the bodies of the Polynesians and many of the Japanese. The operation is very painful. The design is first sketched on the skin with paint or charcoal and then sharp needles are driven in along the lines, after which the coloring matter is rubbed in. Having done the outlines, the details are filled in in the

same manner. On the island of Borneo, to complete the whole body—and there is no portion left untattooed—requires months and even years. In this place a girl is not allowed to marry until at least a portion of the decoration is finished.

Another form of bodily mutilation indulged in by savage peoples, in which the modern woman joins, is piercing the ears and hanging ornaments in the holes. In some cases it is done when the child is very young, and in order to keep the hole open a piece of wood or a straw is inserted. As the person grows older, heavier weights are put in, with the idea of stretching the lobes. By the time maturity is reached the rings with the greatly distended lobes

FIG. 101.—NOSE, LIP, AND EAR PLUGS

Savage showing lip and ear plugs and scars on chest and forehead.

hang well down on the chest, and some of the holes are so large that the ear can be put over the head. The lower lip is also pierced, and plugs inserted, which increase in size as the person grows up. The individual ultimately looks as though he had a

saucer out in front of his face. Filing or chipping the teeth to a point is thought to add to the beauty of some peoples.

Anyone who has been to a dentist knows the agony experienced when a nerve is ever so slightly touched, and yet for vanity's sake there are people who will allow a whole corner to be taken off the tooth with a stone chisel and mallet. Others will permit a good sized hole to be bored through the front of the tooth, tearing away nerves and everything else, in order to be able to put in there a brass plug or a bright bit of stone. Nose rings are also frequent ornaments.

Many peoples consider that the natural shape of the head is not beautiful, and they try to make it conform to their ideas by binding it when the individual is young. The skull is then in a plastic condition and can be molded into almost any shape. If a high point is desired, boards will be bound onto the front and the back of the head and kept there until the skull grows that way. The flat forehead and rounded back or vice versa is obtained by binding only one board.

The Chinese, up to a few years ago, used to bind the feet of girl babies, with the result that when they were older they could not walk without assistance. These people also have the custom of allowing the finger nails to grow very long. Of course only the nonlaboring class can do this, for it indicates that the person does no manual labor. In order to protect these nails, that are sometimes many inches long, there will be worn silver cases that cover the entire nail.

Those savage peoples that have been blessed with an abundant head of hair consider themselves very

fortunate. A great deal of their time is spent in decorating it and cutting it into fancy patterns. Even those whose hair is shorter try to make it appear long by uncurling the tight ringlets and plastering them with grease and clay. The women of China spend hours in arranging their hair in such a complicated structure that they cannot take it

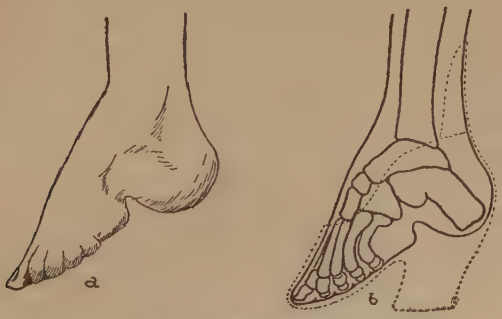


FIG. 102.—CHINESE WOMAN'S FOOT

(*a*) Foot of Chinese woman artificially deformed; (*b*) skeleton of the foot with outline of shoe.

down at night, hence they have, instead of pillows, sleeping blocks which fit the back of their necks but do not muss the hair.

We come now to the subject of navigation. If a man, who is in swimming, is seized with a cramp so that he starts to sink, he will try to save himself by grabbing at a log floating by, but by so doing he is merely taking again the first step in the history of navigation. For a long time this was the only boat that man had. He would float down stream or across a river sitting astride the log and using his hands and feet for paddles. He probably noticed, after a time, that he could reduce the resistance to the water by pointing the end of the log and so he did

this with his rough stone tools. It was only a short time ago that the natives in certain portions of Australia had no other type of boat than this. But this kind of navigation was not very satisfactory for any great distances and so in some unknown way the people learned to hollow out their logs.

A traveler on the Delaware River in 1747 describes the Indians' method of felling a tree and hollowing it out. "They set fire to a quantity of wood at the roots of the tree, and in order that the fire might not reach farther up than they would have it, they fasten some rags to a pole, dip them in water, and keep continually washing the tree a little above the fire until the lower part is burnt nearly through; it is then pulled down. When they intend to hollow a tree for a canoe, they lay dry branches along the stem of the tree as far as it must be hollowed out, set them on fire and replace them by others. While these parts are burning, they keep pouring water on those parts that are not to be burnt at the sides and ends. When the interior is sufficiently burnt out, they take thin stone hatchets and shells and scoop out the burnt wood. These canoes are usually thirty or forty feet long." Other savage peoples build a little wall of wet mud around the top of the log, and within this light their fire.

In order to make the sides rounded, water is placed in the canoe and hot stones dropped in until it is boiling. After the wood has become very pliable, sticks are forced in until the canoe has taken the desired shape and then the wood is dried.

All dugouts are, of necessity, long and narrow so that they are very liable to upset. In order to give them greater height and width boards were fastened to the sides. When it was found that they added

much to the stability of the boat, two boards were put on instead of one. As the joint between the boards was brought below the water line, this seam was calked with leaves, pitch and resin. As the number of side boards increased the solid hull dimin-

FIG. 103.—SAILING BOAT WITH OUTRIGGER

The device was employed on canoes to prevent capsizing. (After Mason.)

ished until it became merely a bottom board or keel upon which the sides were fastened.

Few savage peoples have reached the stage of making boats like those last described above. When they need to navigate in rough water they put outriggers on canoes. These are made by extending from one or both sides of the canoe two long poles, the ends of which are fastened together by a small log, usually hollowed out. The outrigger

prevents the canoe from capsizing even in very rough water.

The first bark canoe was made by a man who stripped the bark from a tree, fastened the ends together and paddled across a stream. If the boat was to be used more than once the ends would be

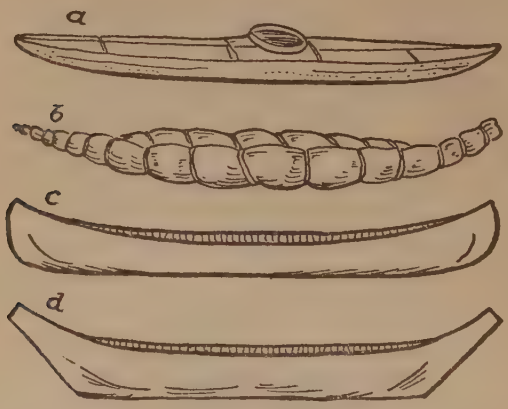


FIG. 104.—CANOES AND KAYAKS

(*a*) Eskimo Kayak, (*b*) Reed Boat, (*c*) Birch Bark Canoe, (*d*) North Pacific Coast Dugout. (After Wissler.)

sewed and possibly calked. It was only a step beyond this to put a wooden frame in to keep the sides apart and to make the craft stronger and more permanent. Where bark is not plentiful, as in the Arctic regions, the skins of animals are used to cover the boats.

In ancient Assyria the people would blow up the skin of an animal and float down the rivers on it. Even to-day on the Tigris River the people will fasten several inflated skins together, put a wooden framework across the top, and float down with their wares to Bagdad. On the Nile the skins are sup-

planted by big earthenware jugs which, after the voyage, are sold.

A raft was first made by fastening several logs together. To lessen the resistance the end was pointed, but even so no great speed could be developed. It was found that the middle logs could be done away with entirely by connecting the two outer ones with light wood. Then by pointing the two remaining logs the minimum resistance was obtained.

The first means of propelling boats was with the hands and feet. When a paddle of wood was invented it was made in the shape of a man's hand and arm. How the sail came into use we do not know. We can picture a man out on a lake with a broken paddle. He stands up to hail his friends on the shore for help, when he finds that the wind is carrying him along. By fastening his blanket to his wrists and ankles and then standing with his arms outstretched

FIG. 105.—A MODIFIED RAFT

In this instance the native has recognized a gain in speed by pointing one end and curving it out of the water.

and his legs apart he is able to get through the water very rapidly. His position is not a very comfortable one for a long voyage, and so he takes a piece of wood and fastens two crosspieces on it, to which he attaches his blanket. Thus he has a square sail with the mast standing for his body and the ends of the crosspieces for his wrists and ankles.

The last subject that we will deal with in this chapter is the evolution of buildings. Man is not the only animal that builds shelters for himself. The birds have their nests, the ants build underground rooms, the beavers construct dams, and the wasps build elaborate hanging nests. But man in his earlier years on earth took shelters as he found them, for he was on the move so much of the time that it was not worth while to construct any form of dwelling. The caves, the overhanging cliffs, and hollow trees gave him all the protection that he needed. In fact if we can believe the evidences of the caves of Europe, man retained them for his dwelling far down in his history. Outside the city of Tours to-day there are many people who have so constructed their houses against the wall of a cliff that one of the rooms of the dwelling is the cave.

The simplest form of protection made by man is a lean-to of boughs and leaves. It is very crude, but it serves to keep off the burning rays of the noonday sun. The first dwelling of any importance was made by putting the stalks of palm leaves in the ground and then bringing their points together to form a roof. It was only one step beyond this when man made a big circle of sticks, tied the tops together and covered the sides with leaves and grass. This was the first form of the tent. The American Indians had their tent so arranged that they could carry it from place to place and set it up in a few moments' time. They used the skins of animals for the covering. At best all of these tents or cone-shaped huts are low except in the very middle, therefore, to get more room some people dug the ground out inside. This gave them what amounted to side walls and a roof and so some clever person saw that the same

shape could be erected above ground by making the walls of straight pieces of wood. Between these upright supports grass was interwoven and the whole affair was plastered with mud.

A great step in advance was made when a house with square corners was first constructed, for a

FIG. 106.—MAKING SUN-DRIED BRICKS IN EGYPT

For making brick, the Egyptians used the material at hand, Nile mud usually mixed with chaff or straw. At the left a laborer is working the mud; another laborer is carrying it away in a bucket. Above, in the center, a bucket is being emptied and a man is lifting a wooden mold from one of three bricks already shaped. An overseer, seated and holding a stick, directs the work. Below, at right, bricks are being carried away by a porter who uses a neck yoke for the purpose. The drawing is made from a wall painting in the tomb of Rekhmara at Thebes and is of the period of the Eighteenth Dynasty, possibly about 1500 B. C. (Metropolitan Museum.)

round house was always small. This was done first by supporting a ridge pole by two other poles and laying from this to the ground long pieces of wood on which leaves and grass could be placed. This roof was ultimately raised on side walls as was done in the case of the round huts. Certain of the American tribes had these long houses, which, by dividing up the interior into small rooms, could be made to contain many families.

In countries where wood was scarce the houses were built of stones and turf. Loose pebbles will not make a very high or very firm wall and so they were piled up with dirt, and wood was laid across the top to form the roof. Where there were flat,

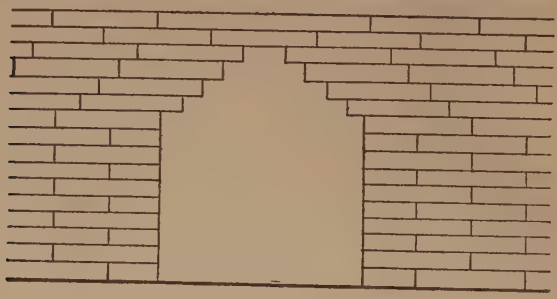


FIG. 107.—A FALSE ARCH

This arch has a capstone instead of a keystone.

stratified stones these could be piled up to make neat strong walls.

We have mentioned the fact that many of the huts of primitive peoples are plastered outside with clay. This would bake hard in the sun of the tropics so that it is not very difficult to see where man obtained his idea for sun dried bricks. After this invention the houses were constructed from this material.

When the people began to build tombs and temples that were intended to last for ages they did not want to use any wood in their structures, but they were faced at once with the difficulty of roofing over a great space by means of stones or bricks. They finally used both the false and the true arch. The false arch is the kind used by children with their blocks, where they will put each one overlapping just a little the one below, until finally they come so close together that one capstone will cover the open-

ing. This gives the effect of a pair of stairs upside down. The real arch is made by shaping the stones and then holding it up by a keystone put in at the top. All the rounded Gothic arches that we see to-day are of this type.

Many of the early races were able to make out of stone, buildings of such size and strength that we marvel at them to-day. People will travel half around the world to see the Pyramids of Egypt, made so long ago that the method of constructing them is lost in antiquity. They were made as the burial place for the kings, and must have taken thousands of laborers many years to construct. The perfection of their huge blocks, cut with a degree of nicety that would delight the heart of a modern stonecutter, and the beauty of the inner chambers and passages, show art so highly developed that we

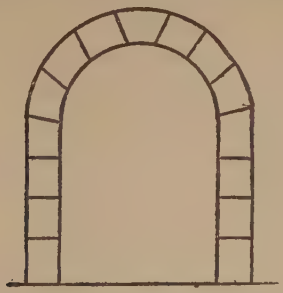


FIG. 108.—THE TRUE ARCH

Once the keystone, in the middle of the top, is in place, the arch becomes a very firm piece of building.

are led to wonder how they ever did it. "The setting of the sides to the cardinal points is so exact as to prove that the Egyptians were excellent observers of the elementary facts of astronomy; the day of the equinox can be taken by observing the sunset

across the face of the pyramid (Gizeh) and the neighboring Arabs still adjust their astronomical dates by its shadow." One of the largest, that of Cheops, is 480 feet 9 inches high, and 764 feet square at the base. It is made of stones, many of which are so large that our modern machinery could not move them. Strange as it may seem, although the early Egyptians have left us in pictures a very detailed account of their everyday life, yet about this one thing, which to us is one of the marvels of the world, their records are absolutely silent. There have been discovered all sorts of tools and weapons, but there is no trace of machinery that would have been large enough to pile these huge stones one upon the other. There is only one theory left for us; that they used no heavy machinery and the method of piling was so simple that no one ever thought to write it down. If our civilization were suddenly to be destroyed, and thousands of years from now a new race should appear that did not use their legs for locomotion, and these new people should unearth a flight of stairs, they would be puzzled as to their use. They might look through any literature that remained but they would find no mention as to how the stairs were used, because the leg motions of going up and down are so commonplace that no one has ever thought to describe them.

We know that the Egyptians had an almost unlimited number of slaves to work for them, and so we can assume that by the use of rollers, levers and by dint of much pulling the foundation stones could be placed. To get the next layer on, they probably built a long inclined plane of sand or other material and with rollers and pulling, managed to get the second stone in place. This process was repeated

until the top was reached, when all the sand was dug away, leaving the completed pyramid.

On the other side of the world, on the plateau of Peru, we find the inhabitants, long prior to the Spanish conquest, erecting buildings of stone that in many ways are more remarkable than those of Egypt. The huge blocks of stone which they used

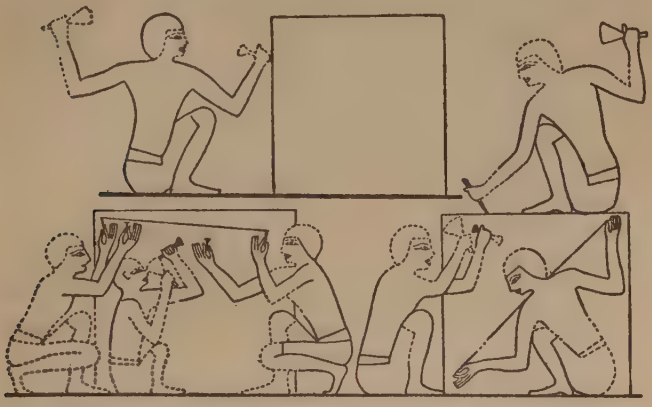


FIG. 109.—STONECUTTING IN EGYPT

From the nature of the land and its climate, stone and brick were the great building material in Egypt. Four of the workmen pictured are dressing down stone blocks with mallets and chisels. Three of the men in the lower row are testing the accuracy of the work, showing what remains to be chiseled away. (About 1500 B. C.) (Metropolitan Museum.)

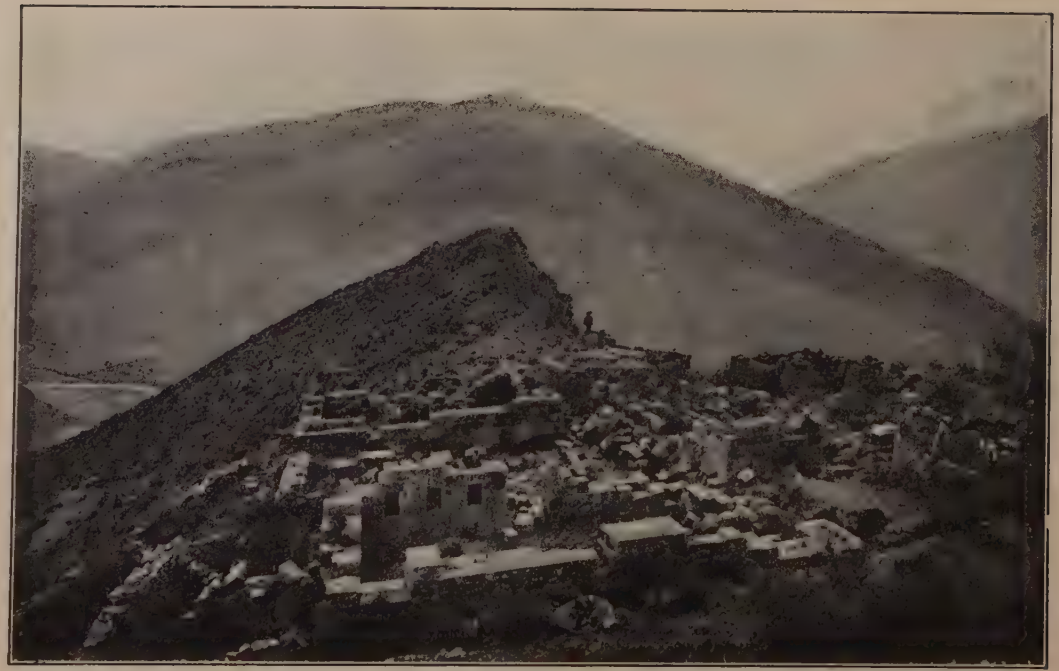
were cut without the use of iron tools and were transported from the quarries across rivers and ravines and were raised to great heights without the use of any great machines. They were adjusted in place with such accuracy and precision that although no mortar or similar substance was used, the space between the stones is so small that not even the blade of a knife can be introduced.

In closing we will mention just one more stone structure of prehistoric times, namely, Stonehenge

on the Plains of Salisbury in England. This structure, which is now in ruins, originally consisted of an outer circle one hundred feet in diameter composed of huge upright stones placed a little distance apart and connected at the top by capstones. Inside this and about nine feet away was a circle of smaller stones standing alone, that inclosed two ellipses of standing blocks. Near the center was a flat blue marble slab that may have been used for an altar. The stones that compose this structure must have been hauled many miles, for there is no rock like them on the Salisbury Plains. Since a similar stone was found some years ago in the bed of a neighboring river, in all probability they were brought there by water. It is not unlikely that in placing the capstones the same method was used as in constructing the pyramids of Egypt.

What Stonehenge was used for we will probably never know, and there are almost as many theories as there are stones. It was evidently built by the ancient Druid priests, and as they were sun worshippers it may have been a temple to that giver of light. One fact seems to uphold this theory. Some little distance beyond the outer circle of stones is a single one standing alone. On June twenty-first, the longest day in the year, and the day which was the most important to the sun worshippers, the sun rises directly over this stone and casts its shadow across the altar. We can almost see the line of priests before dawn on this day slowly wending their way to this sacred temple. In silence they wait until their deity appears on the eastern horizon, and then with shouts of joy, they sacrifice on the altar the human victims who have been dedicated to the sun.

STONEHENGE AT SUNRISE, JUNE 21



INCA OBSERVATORY

CHAPTER XIV

MARRIAGE AND THE FAMILY

THE most important law in the world is that of self-preservation. Man will strive above everything else to keep life in his own body and his efforts have brought about the arts of self-maintenance which we have just discussed. The next most vital thing after the life of the individual is the life of the race, and man's successful attempts to perpetuate this have given rise to marriage and the family. Both self-maintenance and self-perpetuation are based upon fundamental impulses, the one hunger and the other love. In seeking the satisfaction of each, there have grown up in society vast institutions that are at the bottom of much of our civilization. But man is not the only member of the animal world to feel hunger and the sex impulses, for all, from the low organisms up to the most complicated, are driven to action by both of these. The difference lies in the fact that with the lower animals the satisfaction is instinctive, while with man it is conscious planning. The entire life of the beasts is taken up with seeking food, self-defense, and the satisfaction of the sex desire. Nature has taught them how to get a living and how to reproduce, but neither one of these has given rise to even the most elementary form of civilization. If man had gathered his food as he found it without the aid of any tools, if he had defended himself with his fists alone, and if he had re-

mained with the females only temporarily, he would never have raised himself above the level of the apes.

Before taking up something of the human institution of marriage it is worth while for us to look at the lower animals to see if there is any permanency in the relation between the sexes that is in any way comparable to that of human beings. With most animals the sex desire is dominant at only one period in the year, but during this time it overshadows all other feelings. It drives the males into mortal combat with those of the same species with whom they have lived in peace the rest of the year. Certain of the lower animals remain with the females only during this period and many of them are so polygamous that they do not confine their attentions to any one. This whole scheme works out to the advantage of the strong but to the detriment of the weak, for the losers in the combat are not able to possess themselves of any female. The effect that this has on the race Darwin called Sexual Selection. That is, the weak ones do not necessarily die off, as in the case of natural selection, but they are not able to pass on their weakness to the generations to come. This tendency results in a stronger race than could have otherwise occupied the earth.

Among a great many of the animals the males appear in the most brilliant coloring during the courting season, thus attracting the female, for it often happens that it is she who chooses her mate from all those who would woo her. It is an amusing picture to watch several male birds attempting to attract the attention of a female who is apparently paying no heed to any of them. They will dance and strut and jump in front of her, uttering soft cooing sounds or singing as though their throats

would break. As she walks off they follow her, and they will keep up this performance for hours until finally she chooses the one who by his more brilliant plumage, his sweet voice, and his graceful dance seems to suit her fancy. The rejected lovers then start off on another quest to repeat their little performance before some other female.

There is a bird in New Guinea that adopts a unique method of courtship. "This bird of rare beauty, for it is a bird of paradise, constructs a little conical hut to protect his amours, and in front of this he arranges a lawn, carpeted with moss, the greenness of which he relieves by scattering on it various bright-colored objects, such as berries, grains, flowers, pebbles, and shells. More than this, when the flowers are faded he takes great care to replace them by fresh ones, so that the eye may be always agreeably flattered. These curious constructions are solid, lasting for several years, and probably serving for several birds."

The lower we go in the animal scale the less care do we find being expended on the offspring. Most of the fishes deposit their eggs and pay no more attention to them. The average reptile will lay her eggs in some warm, sunny spot, between moss and leaves, and then never see them again. There are a few exceptions to this, where certain of the larger serpents lay them in a pile and then coil themselves around them in a great hollow cone.

Among very few of the vertebrate animals do we find both parents looking after the young. When it does occur, as among some birds, it lasts only a short time, or until they can shift for themselves. When they are old enough, the mother will frequently drive them from the nest with her sharp

beak. Most birds will teach their young ones to fly or swim before turning them out into the world.

In the case of some animals the males seek to destroy the young or to break the eggs, so that it devolves upon the mother to fight for her offspring or to carry them to some safe spot where their unnatural father cannot find them. But among birds bad fathers are rare. Some are even more solicitous of the young than the females, and numerous examples can be cited where the male will feed the female while she is sitting on the nest or will take her place while she is away for food.

Among certain animals there is some permanency in the relations of the sexes. We mean by this that a male will go around with one or more of the same females for weeks, months, or even years. The gorillas travel through the forest in small bands consisting of one male, several females, and the offspring. When the male young are partially grown they are driven from the group by the father, for he fears that his place may be usurped by the younger element. Sometimes the gorilla family is smaller, made up of the mother, the father, and the children. The male will frequently sleep at the foot of the tree to protect the female and the young, who are in the branches above, from the attacks of leopards or other nocturnal prowlers.

There are many birds who are monogamous, in fact, some one has said that "real genuine marriage can only be found among birds." The union of the bald-headed eagle lasts until the death of one of the partners. In one species of parrot, widowhood and death are synonymous, and the doves experience lasting grief when their mate is gone. "The male of a climbing woodpecker, having seen his mate die,

tapped day and night with his beak to recall the absent one; then at length, discouraged and hopeless, he became silent, but never recovered his gayety."

From this brief description of the animals we recognize that many of their groups are in some respects not unlike human societies, and the individual members bear a close resemblance to a great number of their human brothers.

Before we can understand much about human family life it is necessary to recognize that there is a difference between the relation of the sexes and marriage. The former may occur on any stage of development and is only of the most temporary nature, while the latter is an institution, and therefore presupposes some degree of permanence. One prominent writer has said that "marriage is nothing else than a more or less durable connection between male and female, lasting beyond the mere act of propagation till after the birth of the offspring."

There is no evidence to prove that at any time in human history a state of absolute promiscuity existed. That is, when all the men held all the women in common with no individual sense of possession. Even among the lowest tribe to-day the women are held by certain men, and while there may be, according to our standards, gross immorality on both sides at all times, and while divorce may be easy, yet the tie lasts long enough to enable us to call it marriage. Some writers have tried to prove by examples that in parts of the world absolute promiscuity exists, but the evidence is not convincing enough to enable us to say that it was the common practice with our most primitive ancestors. The fact that we find a certain degree of permanency among a good many animals, especially the apes, precludes the idea that,

for the evolutionary series, absolute freedom must have been the first stage.

There are several theories advanced to account for the origin of this institution. We can, of course, eliminate at once the idea that it was necessary for the physical relation of the sexes, for it is obvious that this has taken place entirely apart from any thought of marriage. Children are the natural result of the sex union, and, therefore, some writers have advanced the theory that the man stayed with the woman in order to help in their care and protection. Among a great number of the savage peoples the act of bearing a child is not attended with prolonged incapacity or even any great discomfort. It is not at all uncommon, where a tribe is on the march, for a woman to stop, bear her child, take it down to the river, wash it, and then run on to catch up with the rest. Her daily work is seldom hindered and she is always able to tend the infant in every way from the moment of birth. We are able, therefore, to eliminate the idea that the man was necessary in order to support the woman during a period of helplessness. However, on this early stage the children could not be weaned until they were several years old, for they could not be fed on the ordinary diet, and the milk of animals was unknown. A woman with a child was unable to move from place to place in search of food as rapidly as one who was unhampered, and hence the man could help very much in supporting her. A lone woman on this early stage of civilization was able to defend herself with as much ease as the man. But it was more difficult when she had a child with her, and so the man played an important part in protecting both of them.

Romantic love in the sense that we know it now was almost nonexistent at that early time, and it is also very doubtful if paternal affection was developed to any degree. Why, then, was the man willing to take upon himself the responsibility of a family? He did not need marriage to give him sex satisfaction and he could not wander with the same freedom through the forest if he had women and children to look after. He was the most selfish of animals, so that we cannot suppose that he was prompted by any great altruistic motive. The answer is probably an economic one. He wanted some one to do the things necessary for his comfort that were distasteful to him. For this reason he was willing to limit his freedom and to put forth protective effort.

We find in this the first form of division of labor. Two men living together do not form a satisfactory combination, for they both want to do the same things. Neither one, of his own volition, desires to remain in the camp to look after the fire and to perform the necessary tasks. Each prefers to hunt and fight, and if either gives up it is only because he is forced to by his stronger companion. But with the woman it is different. She is by nature the passive element while man is the active. She enjoys remaining in one place to look after the camp and is perfectly contented to let her more vigorous mate wander through the forests in search of game. Hence the union of a man and woman is a good combination, for both do the things they enjoy and leave to the other the things which would be distasteful.

On the earliest stage, when a man wanted a wife, he went out and captured her. She may have

already belonged to some one else, but might was right at that time, and so if he could get her away from her husband he would drag her, screaming and fighting, back to his own cave. She was held there by force, but as strength and not weakness appealed to her, she soon became contented until some one stronger came to carry her off. In all probability her first husband tried by every means to get her back again and it was only when her second had either killed him, or instilled a healthy fear of greater strength, that he desisted entirely and left her in the hands of her captor.

As the ages advanced and the family group grew into the clan, and the clan into the tribe, it became customary for a man to seek a wife outside of one of these groups. We cannot go into the detail of the various theories as to why this was done. There may have been the horror of too close a union within the family, a feeling which prevailed as blood relationship spread to the larger groups. Possibly, the evil effects of too close inbreeding were known, but it is doubtful if they had any deep conception of the laws of heredity. However, the fact remains that among a great many of the early peoples a man sought for his wife or wives outside of the particular small group to which he belonged.

The process was simple. He would steal over to the vicinity of the neighboring tribe and lie in wait by the water hole or some other spot where he knew the women would pass. When a comely maiden appeared who suited his fancy he would seize her, or, possibly, lightly tap her over the head with his club to keep her still and then drag or carry her back to his own camp. The woman usually bowed to the inevitable and took up her domestic duties as though

nothing had happened. She had seen her own brothers get wives in a similar way, and she realized that as it was the custom there was nothing wrong about it, no matter how much momentary unpleasantness there might be attached to it. But the capture was seldom by any means as simple as we have indicated here. Her fellow tribesmen and tribeswomen tried by all means to rescue her, and it was not at all uncommon for a war to start on the strength of the capture. If her tribe was victor she would be rescued and her male captors put to death or enslaved, while the women would be taken prisoners to serve as wives.

Realizing the difficulties in the way of getting a wife by this means it was only the boldest of suitors who dared to fare forth alone. As a rule, he took with him a group of his own tribesmen who would drive off the girl's friends until the happy bridegroom had reached a safe distance with his prize. There was no sham about the fighting on both sides and frequently the casualty list was large.

This condition of affairs could not go on indefinitely, for it meant almost constant warfare, and in this state the arts of peace were at a standstill. The women may have had a good deal to do in changing the custom, for it meant that their husbands' group was at constant war with their relatives and friends in the tribes in which they were born. However, it was still necessary for the men to get their wives from another clan or tribe than their own. Some sort of an agreement was reached which enabled the men to do this. While the fight was not given up, instead of being real it was only a sham. A man would go to a near-by tribe with a group of his friends and steal a girl. Her friends would pretend

to fight to get her back, and though there were some sharp blows delivered on both sides, they were not, as a rule, fatal and the capture did not lead to war.

At a wedding to-day in a great church, where the groom has his best man and his ushers, and the bride her bridesmaids in their beautiful gowns, there seems to be very little to remind one of the savage. Yet if all the culture that surrounds a modern wedding party were suddenly to be taken away, and we could see things in their real light, the men who attend the happy groom would be those who stole with him to the neighboring tribe, to help him capture the bride, and her attendants would with sticks and stones try to prevent her abduction.

Let us see a few of the survivals of capture among the various races of the earth. The first thing to be noted is that in nearly all cases the man makes some arrangement beforehand with the parents of the girl, and either pays for her or gives presents, which amount to the same thing. The girl is not always consulted, and so when the gentleman seizes her and starts off she is taken completely by surprise. Among the nomads of central Asia the bride, dressed in her best, rides away on a fiery steed followed by the groom and the wedding guests. She tries to avoid them as long as she can, but she is at last caught and brought back for the feast. Among certain tribes in India the groom goes with his friends to the house of the bride. There he meets her friends and a mimic fight takes place in which he is always the victor. He carries her off and then gives a feast to both parties. In Greenland when a man wanted a wife he went to the tent or hut of a girl, seized her by the hair and dragged her home. Whether she wanted to go or not, she

would put up a terrible fight, screaming and kicking and scratching, for to go calmly would show that she held herself very lightly. She would even try to run away after she had reached her new home, so that her husband would frequently have to scratch the soles of her feet so that she could not walk for a few days.

It was not so many years ago that the ceremonial of capture was given up in Wales. "On the day fixed, the bridegroom and his friends, all on horseback, came to take the bride; but they found themselves in the presence of the friends of the young girl, also on horseback, and a mock fight ensued, during which the future wife fled on the crupper of the horse of her nearest relative. But instantly the squadron of the bridegroom, counting sometimes two or three hundred horses, galloped in pursuit. Finally they rejoined the fugitive, and all was terminated by a feast and common rejoicings." This ceremony was ultimately abandoned when at one wedding a nobleman had an eye accidentally put out.

The custom which prevails in a good many places of the groom carrying the bride across the doorstep of their house when they return after the wedding ceremony, is thought by some to be a survival of capture.

One of the commonest forms of marriage among the primitive peoples is that by purchase. It is based on the theory that the parents own their children, body and soul, and that they have the right to dispose of them in any way that they see fit. They can kill them if they are deformed, they can give them away, or they can sell them. The girls are regarded as property of value to be disposed of to the highest bidder. In New Mexico the Indians

used to auction the women off. After the actual capture of wives had fallen into disuse it was necessary for a man to purchase a girl whom he desired. Frequently the parents would have a set price, but if there was more than one suitor, they would let her go to the one who could give the greatest amount. The girl was seldom consulted in the matter.

Among the Hottentots the girls are paid for in cattle, which are the money of the country, and the price varies with the fluctuations of supply and demand. Some peoples regard children as a valuable aid in carrying on the necessary work of the farm or household. The more children they have the less work will the parents have to do, hence when a man wants to marry one of the daughters he pays on the basis of one laborer; that is, he gives enough to enable them to hire some one else in her place. Others charge the amount it has cost to bring the girl up.

When a tribe is low in the stage of development, or where there is not very much private property, a man will work in order to gain his wife. He will live with her parents almost as a slave for a term of years, or he will be obliged to give them the major portion of the animals killed in the hunt. This mode of marriage was not uncommon among the North American Indians.

The system of purchase is a favorite one with savage women, for it gives them the feeling that they are of great value. The higher the price that has to be paid for a bride the better she likes it, for it makes her feel that she is no cheap article. These women look down upon those of the white race, thinking that they must be of very little value when they are willing to give themselves away. It is a

matter of everlasting shame to a savage woman if for any reason she does not bring in a big price to her parents.

As people became more civilized the purchase of women was gradually discarded. Instead of paying the actual value of the girl a gift would be given by the groom either to the bride or her parents. They in turn would give to him articles of about the same value. As time advanced we find the dowry system appearing, which, in a way, was the purchase of the husband by the bride. Her parents would give her a good many things with which to start her new life, such as cattle, slaves, household articles. The origin of this custom is lost in obscurity, but it may have come about in a state where there were more women than men. In order, therefore, to get a husband a woman had to make herself as attractive as possible to the men. Frequently a girl will start almost as a child to collect things for her dowry and she will not hesitate to ask her friends to help her out by presents. We have here, doubtless, the origin of the modern wedding presents. The dowry system is common in Europe to-day, and a man will often pick out his wife on the basis of the amount that the parents will give to the girl.

The form of early marriage depended largely upon the economic condition of the people. Each group has had, since the beginning of human association, one of the three main types prescribed by custom. These are, *Polyandry,* or the union of one woman with several men; *Polygamy,* where one man possesses several women; and *Monogamy,* or the association of one man and one woman.

Before looking at any of these forms we want to realize that there are few universal ideas of right

or wrong. This is most certainly true in regard to the relation of the sexes. The fact that some other peoples in a distant part of the world do not think and act as we do, does not, of necessity, mean that we are right and they are wrong. Through long ages each group has built up customs and institutions that suit the environment and the stage of civilization upon which the people find themselves. We must judge them, therefore, by their own standards, not by ours. If a man, by the customs of his country and his religion, is allowed three wives and he takes a fourth, he is immoral. With us if a man has two wives he is a social outcast. Thus when we find a state of polyandry existing as a recognized form of marriage we must not regard the people as beyond the pale of human decency.

We cannot say that polyandry has ever been widespread in the world, nor was it, of necessity, one of the first stages in the evolution of marriage. The chief centers in which it exists now or has existed are Asia, India, Ceylon, and Tibet, but in no one of these places has it been the universal form. It occurs only where there are more males than females in the community and where the environment is difficult. If a man has property that is just large enough to support him and his family, there will not be enough for any one of his sons if, at his death, it is divided among them. Hence, to avoid this difficulty the brothers all live together, and instead of each one taking a wife, they will share one in common. Any children born will be supported by all of them or, as is the custom in some places, the first born belongs to the oldest brother, the second child to the next oldest, and so on down.

Among some of the peoples mentioned above the wife will live with each brother for a month at a time; during which period the others have nothing to do with her. There are not many cases where the husbands are not either brothers or in some way related. Neither do we find polyandry existing in a country where the sexes are more equal in number or where there is a greater proportion of females. We are safe in saying that it occurs only in regions where the food supply and property is very limited and there only because of economic necessity.

Polygamy is one of the most widespread forms of marriage, although it is confined largely to the savage and barbaric peoples. It usually calls for a society where there are a greater number of females than males. This condition exists in nearly all the early communities, for the males are constantly exposed to dangers of battle and the chase, so that their number is kept below that of the females.

In a great many parts of the world where polygamy prevails, the number of wives allowed to one man is not definitely stated and he is, therefore, free to take as many as he can support. However, the fact that in some places he must give each her own house, slaves and property, acts as a deterrent to a man having a large number of them.

There are some people who have adopted this system from an economic rather than from a sex reason. The more women there are around, the less work will the men be forced to do. Even the lowest hunter wandering through the forest for his food has game to be carried, fires and shelters to be built, berries, roots, and nuts to be collected. The wives do these things besides giving birth to children who may later be sold, bartered, or even eaten.

When the agricultural stage is reached even more women are needed to help in the fields with the plowing, sowing, or reaping. For instance, in New Caledonia where the system of plurality of wives is in force, the people are dependent largely upon agriculture for their sustenance. The men are obliged to work in the fields unless they can get substitutes, but as slavery does not exist there, they cannot turn to that source of labor. Hence a man will take to himself wives in proportion to the size of the fields owned by him.

One of the most widespread attributes of the civilized portion of the human race—at least the female part of it—is jealousy. It is not hard to picture the way in which domestic happiness in this country would be interrupted were we suddenly to adopt polygamy. There are few wives who would allow their husbands to bring in another woman to share the joys and sorrows of the home. But this is just what happens in so many of the uncivilized states, and the strange part about it is that the women not only do not object to it, they like it. Marriage to them is a straight business transaction and when they leave their own home for their husband's they are merely going from one master to the other. Love, as we know it, does not enter into the proposition. Hence jealousy is almost unknown.

Women in such an environment are really the slaves and the beasts of burden for the men and hence the first wife gladly welcomes any others who may help her bear the heavy load. Among the Zulus the first wife purchased by a man will work hard to collect enough to enable him to buy another one who will share her hard life with her.

When the higher barbaric stage has been reached the number of wives is frequently limited, but a man can have numerous concubines and slaves. Of course the rulers and nobles were free to have as many as they chose, and in the Old Testament we read that "Solomon had seven hundred wives, princesses, and three hundred concubines," while Rehoboam "took eighteen wives and three score concubines." Among the European Jews in the Middle Ages polygamy was still practiced, and among the Jews living in Mohammedan countries it occurs even to-day. The Koran, which is the sacred book of the Mohammedans, allows a man four legitimate wives and as many concubines as he chooses to take. There is not a great difference between these two, except that the former has her father as a protector while the latter is defenseless against the husband.

The most widespread of all forms of marriage is monogamy and it occurs with the greatest frequency among the civilized races. We have seen that polygamy is common where there is a great disproportion between the numbers of men and women. However, as the death rate of the men decreases the need for this marriage system dies out. Add to this the fact that on the higher barbaric stages, although law, religion, and customs sanctioned it, yet it became so increasingly expensive that only the rulers and the wealthy could afford it. This resulted in the great mass of men being satisfied with one wife apiece, so that ultimately public opinion came out in favor of monogamy. One further cause that led certain societies to adopt monogamy was the development of private property and the custom of handing this on, after death, to the offspring. It is only

under this system that both the father and the mother are the same for the children. This condition must exist in a society where hereditary property plays an important part in the economic life of the people.

It is claimed that most of the civilized countries are monogamous, but this is true in name only, much as we dislike to admit it. While a recognized system of concubinage does not exist, yet under the name of prostitution it is a very real factor to be dealt with.

What the future of the marriage institution is to be we can only guess. Figures prove conclusively that divorce in all the civilized countries of the world is rapidly on the increase. A man and a woman will live together until circumstances arise which make the life of one or both intolerable and they will then invoke the law to separate them. We are not predicting, we are merely suggesting that in the future divorce will become even more common, so that a system of legal trial marriage will prevail. The couple will live together until they are tired of each other's company and they will then separate, he, possibly, to take another wife, she another husband. But what of the children? Evidence seem to prove that the state is ever becoming more interested in the welfare of its young. Child labor laws, municipal playgrounds, free milk stations, and a dozen other similar institutions show some of the methods used to insure more healthy men and women for the future. Will the State ultimately step in and offer to act as the impersonal parent where the real ones have found life together intolerable? It is obvious that much will be lost by this system, but still it may be a necessary solution of the problem if

divorce increases at the same ratio in the future that it has in the past.

At the present time there are many people who consider that religion is a very necessary part of the marriage ceremony. In fact it is not uncommon to hear a woman say, "I would not feel as though I were married unless I had the religious ceremony." This condition has not always existed. There was a time when there was absolutely no connection between the two, and even to-day the State demands that its permission be secured before a wedding ceremony can be performed by the church.

Before we can take up the origin of the relationship between the two, we must look at some of the primitive marriage ceremonies and see the purpose lying in back of them. Of course at the beginning there was no ceremony of any kind. A man merely took the woman by force home to live with him. It was soon known by all in the group that such and such a woman from the next tribe belonged to the man and was living with him as his wife. This sounds very crude, but after all that is merely the information that is given to the world by a big church wedding to-day. In the presence of witnesses a man and woman say that they intend to live together as husband and wife.

One of the first forms of ceremony occurred after the capture of the woman had ceased to be a reality and remained only as a survival. As we have already shown, the mimic fight was carried on in the presence of the friends of the man and woman, and this was frequently followed by a feast in which both parties participated. Where there is no simulation of capture the interested parties with their friends come together on the appointed day, the last

of the purchase money is paid, and a feast with games and dancing is participated in by those present.

Among some of the more civilized races there are ceremonies to indicate the binding of the couple together and some act which indicates that the woman will serve her husband and submit to his rule. The Hindu bride and bridegroom have their hands bound together by grass to show that they are united for life. In other places the bride unties the string of her husband's sandal or does some similar act to indicate her submission to him.

In a great many of the marriage ceremonies of the savage people religion has a prominent place, for through its agency they hope to pave the way for happiness in the future. As we shall see in the chapter on Religion, the savage feels that the unseen world about him is peopled with a host of evil spirits who are forever seeking to do him an injury. He wants to avoid these as much as possible and to do this he employs the agency of the one person who knows how to deal with them—namely, the priest or medicine man. They feel that these spirits do not want to see people happy, and as joy is supposed to be at a wedding, the priest is called in to ward off any evil influences. By various ceremonials, so different in separate parts of the world, a successful present and a happy future is assured. Should things not turn out as they were planned, it is easy to assign the cause to the actions of an evil spirit from a neighboring tribe. When the priest realized the power that he had over the people through the influence of religion, he was loath to let it go. The result has been that religion has played an ever increasing part in the marriage ceremonies of the

civilized races of the world. The State, however, has not given up its hold on the marriage institution. It requires that a license shall be first obtained and then the persons interested can have the ceremony performed either by a civil officer or by the church. Some countries require a civil marriage, which may be followed by a religious one, but the latter is not necessary to legalize the union.

It is interesting to quote part of the Hindu marriage ceremony. After prayers have been offered by the priest, and the bride and groom have been tied together, the woman says to the man: "If you live happy, keep me happy also; if you be in trouble, I will be in trouble too; you must support me, and must not leave me when I suffer, you must always keep me with you and pardon all my faults; and your poojas, pilgrimages, fasting, incense, and all other religious duties, you must not perform without me; you must not defraud me regarding conjugal love; you must have nothing to do with another woman while I live; you must consult me in all that you do, and you must always tell me the truth. Vishnu (god of preservation), fire, and the Brahmans (priests) are witnesses between you and me." The man replies to this: "I will all my lifetime do just as the bride requires of me. But she must also make me some promises. She must go with me through suffering and trouble, and must always be obedient to me; she must never go to her father's house unless she is asked by him, and when she sees another man in better circumstances or more beautiful than I am, she must not despise or slight me." To this the girl answers: "I will all my life do just as you require of me; Vishnu, fire, Brahma and all present are witnesses between us."

This, of course, expresses ideas that are far above any of the savage peoples; but it is interesting to see how closely many parts resemble portions of the Christian marriage ceremony.

Before closing our discussion of marriage, it is important for us to deal briefly with the relationship existing between parents and offspring and the part that this has played in the family and tribal rule. In societies where women are associating with numerous men, some of whom she unites with legally, and others surreptitiously, the exact father of any children born to her is doubtful. This, of course, means that when a degree of civilization is reached, where property or the name goes from parent to offspring, the mother and not the father has everything to say. She gives the children her own family name and it is through her line that property descends.

While the relationship between the father and child is in doubt, there is no question that all the children of one mother are brothers and sisters. Hence, it comes about that a child's nearest male relative is not his father, but his mother's oldest brother, that is, his uncle. This man will look after his sister's children and to them he will leave his property. They turn to him for advice in times of trouble and he regards them as a modern father does his own offspring. His children, on the other hand, are looking to their uncle in the same way. For instance, in Bengal a father is free to give presents to his children, or rather to the children of his wife, but at his death all that he possesses goes to his sister and her children. The women arrange the marriages for their offspring without consulting the men.

All this means that the mother-family or the matriarchy, so called, is all powerful, and many writers argue that because of this the original tribal rulership was in the hands of the women. In the League of the Iroquois, which played such an important rôle in the Indian history of this country, the women were the absolute rulers in the family, they had equal voice with the men in the clan, and their opinions were regarded in the tribe.

This, in brief, is the history of human marriage. It, like all other institutions, started from the simplest forms with no rules or regulations. The strongest individuals being a law unto themselves, marriage did not take on a definite character until groups became larger and the will of the individual was subordinated to the good of the many. The most powerful factor in shaping this institution and carrying it through the various forms, has been an economic one. If in a group there were more males than females, and if the environment was a difficult one, polyandry prevailed. But if, on the other hand, the proportion between the two was the other way and the struggle for existence was not too strenuous, a man could have as many wives as he could support. While we find monogamy here and there among the savage peoples, yet it was not the common form until the highest stages of civilization had been reached. Under this system one man and one woman with their children make up the smallest unit of the nation. This has proved to be the most satisfactory up to the present time, but whether some new form will develop out of this, the future, which is hidden from us, alone will tell.

CHAPTER XV

THE ARTISTIC FORMS OF PLEASURE

THERE are no peoples in the world to-day so low in the scale of civilization that they have not some form of art. In a great many cases it is crude, and so near the beginning, that we of a higher race can see no beauty in it. But to them it is a thing of beauty and a joy forever. It would almost seem as though the artistic impulse, developed to a greater or less degree, were one of the fundamental human instincts. The modern child at three or four years of age will draw crude pictures of houses, people, animals, and flowers, and will show them with great pride as works of art. This same child, even before this time, will lie in his cradle crooning songs of his own and when he is old enough to walk he will dance with great glee to any music which he hears. Thus drawing, singing, dancing have their germ not only in the childhood of the individual but also in the childhood of the race.

Those who visit the great art galleries of the world or spend hours at the opera or at beautiful concerts, can scarcely realize that the origin of these things must be sought among the savages. It seems a long jump from the sand drawings of the Australians to a Murillo painting; from the rough wall sculptures of the Crô-Magnon man to a statue by Thorwaldsen; or from the wild singing and

dancing of almost any savage tribe to an opera by Puccini. Yet step by step the development of these arts has gone on so slowly that it is only when we look back over long ages that we can see any upward movement. It is our purpose here to trace back to

FIG. 110.—SHELL AND TWISTED HORN

A bit of ancient Peruvian carving, in which a child is making use of one of the earliest musical instruments—a shell.

the simple forms many of the æsthetic arts which to-day in their greater development delight the ear and eye of the civilized world.

We cannot say which one appeared first, if, indeed, any one of them did; but in all probability most of them were inherent in man from the beginning of the human era. Since one of them must be discussed first, we will take up painting. The first evidence of this art is found in the decoration of the body. As this has already been dealt with in another chapter it is not necessary to repeat the discussion here. After pottery and basketry had been discovered, it was only one farther step in

development to apply to them the patterns that had been used on the human bodies. The designs were in all cases either geometric or symbolic. At first only one color was used, but later the primitive peoples learned the art of mixing paints and dyes

FIG. 111.—CAVE DRAWING OF GREAT STAG

A picture that shows true artistic impulse, from the cavern at Altamira, Spain. (American Museum of Natural History. After Breuil.)

so that they were able to tint their pictures with almost rainbow hues.

In the chapter on the cave men we saw the height to which these people had gone in drawing and painting on the walls of the caves. They knew many of the fundamental laws of the art, such as perspective, proportion, and shading. The Bushmen are born artists and they decorate the walls of their caves with pictures of their every

day life. In this they differ from the older cave men, for the latter drew and painted more from the artistic than from the historical viewpoint. While many

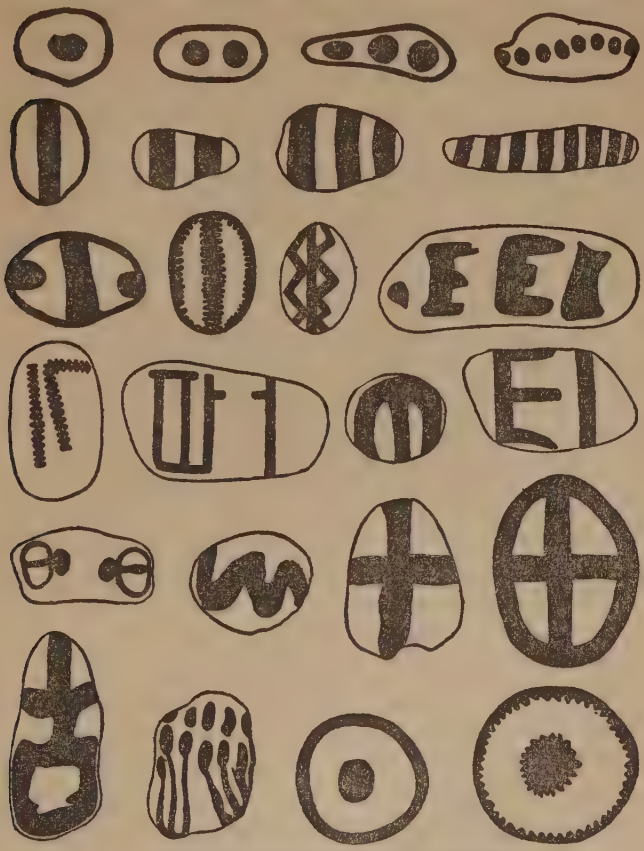


FIG. 112.—ELEMENTS OF DESIGN

As prehistoric Europeans (Azilian) painted them on pebbles. (American Museum of Natural History. After Piette.)

of the Bushmen drawings compare favorably with the best of the Crô-Magnon efforts, yet a large number were sketched obviously with the purpose of

telling the story of a raid or a battle. In doing this they were really developing a picture writing.

It is difficult to deal with the beginning of painting apart from sculpture, for they both arose from the same fundamental desire to imitate and both arts were frequently carried on by the same person. The indications are that the cave man who painted the buffalo upon the walls of his home was the one who cut the same animal in bas-relief. The savage carved the handle of his dagger with the crude figure of an animal or with the half-animal, half-human creation of his own brain. He then painted these in fantastic colors to make them seem more real or more horrible. Of course to-day there is a great difference between these two arts, but in early history all statues and figures were colored in order to give them a more lifelike aspect.

The peoples of New Zealand have developed great skill in carving both wood and stone. They have erected huge figures as memorials to their dead chiefs, which are supposed to be likenesses of the departed. Other figures are of their various gods and look like nothing ever seen on the earth, but they are worshipped with deep reverence.

We constantly speak of the height to which the art of the Egyptians had reached, but when we examine many of their paintings and their sculptures we find that they were often not as true to nature as were those of the Bushmen. Many times these more civilized peoples were desirous of telling a story or portraying an incident in their history rather than creating a work of art for itself alone. When they wanted to show that a certain king was a great warrior who slew numerous enemies, they would picture him ten times the size of the others,

striding over the battle field with a dozen barbarians grasped in one hand and the sword with which to kill them in the other. Likewise the Assyrians, whose art, in many respects, was like that of the Egyptians, saw nothing wrong with making two bowmen fill an entire parapet of the wall. It is

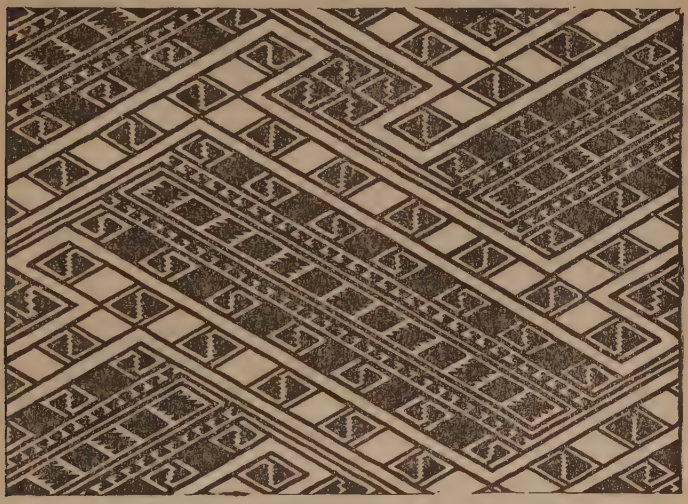


FIG. 113.—PREHISTORIC INDIAN BLANKET

This beautifully designed product of the weaver's art was found in Utah. (American Museum of Natural History.)

from the wall paintings that much of the Egyptian history has been reconstructed. They portrayed very vividly the everyday life of the people. The methods of agriculture, and of fishing, the shoemaker at his bench, the feasts of lords with their musicians and entertainers, are all clearly drawn. These pictures were badly colored with daubs of paint with but little attempt at shading. They would make the hair of a person solid black, the skin brown and the clothing white.

The Egyptians were great stonecutters and many of their buildings were decorated by the statues of kings. While these were huge in form and accurate in proportion, yet they lacked all the grace and beauty that we find in the art of the Greeks. These latter advanced the sculptor's art to the highest pinnacle and gave to their statues life and expression that had been lacking up to that time. But even the Greeks colored many of their works of art, for they felt that the cold color of the stone could not express the entire beauty of the living.

When people ceased to color their statues and left them in the natural tone of the stone, the two arts became distinct, but it is evident that civilization had advanced very far before this state of affairs came about.

Lack of space prevents our tracing the history of the development of these arts down to modern times. Before leaving the subject, however, it is interesting to note that landscape painting did not reach any great height until very modern times. If the reader will notice some time an Italian painting of the Middle Ages in which there is a landscape, he will see there an absolute disproportion between the main figure and the background. This latter seems to bear no relationship whatsoever to the human figure or figures in the foreground. The artist, however, was not trying to convey the impression that the particular person represented was standing in view of those mountains, rivers, lakes, and villages. He was trying by the environment to portray something about the mood or character of the person. That is, a dark heavy background would indicate a totally different feeling from one in which the sun was shining or a placid river with

flowers blossoming in the fields through which it ran. To-day the picture forms a composite whole and if the artist wishes to carry out the old idea he will make it in proportion to the other parts of the picture.

We now come to a discussion of the dramatic art. Numerous books have been written during the past fifty years on the history of the drama. It has been studied from every angle, but most of the writers who have traced its evolution have carried it back to the Greeks and there left it. They have apparently assumed that it could not have had its origin in any lower stage of development. This art, however, like any other is found in some form among nearly all the savages, for it springs from the same impulse that first gave rise to painting and sculpture, namely, the desire to imitate.

The origin of the drama is to be found in language. As we saw in another chapter, the very early peoples had difficulty in conveying their ideas to each other. They first had recourse to the gestures and signs which in the beginning were simple but later became complex. A group of men would return to the camp at night after a day of hunting. They wished to tell their friends of the experiences, but as their spoken language was entirely inadequate, they had recourse to acting. One man would take the part of the animal; the others, the parts of the hunters. They would go through the movements of finding the animal, of stalking it, and finally of killing and cutting it up. All this was done without the use of any words.

As time went on and language became more fully developed, the people still clung to these little dramatic presentations, for they received a great

deal of pleasure from the acting. But it was not long before the purpose again became serious, if, indeed, any time elapsed. As the struggle for existence became somewhat less strenuous, due to the ever-developing mind, the savage had more time to think of other things besides the mere creature wants. He naturally turned his attention to such questions as his own origin and that of the things with which he found himself surrounded. He had, of course, no written records where he could get facts, his mind was not enough developed to give him the power of accurate reasoning, and hence his imagination was given full sway. The result was that he created numerous stories dealing with beginnings. These were all closely bound up with his religion, for anything unknown and mysterious must be attributed to spirits. He peopled the world about him with a host of these airy creatures, for he thought that they occupied not only the air, but also every animate and inanimate object. He felt that they were naturally unfriendly and were seeking in every way possible to do him an injury. Hence it was not unnatural that he should strive to keep in their good graces in order to ward off much evil that would otherwise have come to him.

To talk with the spirit world it was necessary to employ a language that was known both to man and to the dwellers on the other side. As the spirits had at one time occupied this earth as human beings, and as it was believed that, although departed, they still kept many of their human qualities, it was thought wise to address them in a language which they would understand. Having actually lived when spoken language was meager, the dead had communicated with each other in their lifetime by means of

signs and gestures. Hence the desires of men should be presented to them in these terms. Thus it came about that when the savages wanted the gods or spirits to do something for them they would act out their request. For instance, when rain was desired for the crops a man would get up a tree and pour water on the ground as a symbol of falling rain. Before going out on a hunt the men would go through the motions of killing the animals with the hope that the spirits would see the actions and grant the requests. "Led astray by his ignorance of the true causes of things, primitive man believed that in order to produce the great phenomena of nature on which his life depended, he had only to imitate them, and that immediately, by a secret sympathy or mystic influence, the little drama which he acted in forest glade or mountain dell, on desert plain or wind-swept shore, would be taken up and repeated by mightier actors on a vaster stage." This forms the basis of a large part of the serious savage drama.

Let us now examine one or two of these simple dramatic performances of the savages. The most important activity of any group is the obtaining of food, and as we have seen, the primitive man depends almost entirely for his sustenance on the animals of his environment. If he is living in a country where game is not plentiful or where there are periods of scarcity, it is to the gods, through the medium of the drama, that he first turns in order to get aid. "Among the Mandan Indians, when the hunters failed to find the buffaloes on which the tribe depended for food, every man brought out of his lodge the mask of a buffalo's head and horns with the tail hanging down behind, which he kept

for such an emergency, and they all set to 'dance buffalo.' Ten or fifteen masked dancers at a time formed the ring, drumming and rattling, chanting and yelling; when one was tired out, he went through the pantomime of being shot with bow and arrow, skinned and cut up; while another who stood ready with his buffalo head on, took his place in the dance. So it would go on without stopping day or night, sometimes for two or three weeks, till at last these persevering efforts to bring the buffalo succeeded, and a herd came in sight on the prairie."

Another function to which the drama is put among savage peoples is in connection with the initiation of the boys into the tribe as men. Up to the age of puberty they have been living with their mothers and sisters, but at this time they must leave their company and join themselves to the men. Before they can do this they must be taught their tribal history and all the customs of their group. In Australia these dramatic ceremonies occupy much of the time not taken up with the actual getting of food. They begin when a boy is twelve years old and are often not finished until he is twenty-five. This seems a long time, but it must be remembered that most of his education is carried on through their medium. There are not many peoples who devote this much time to the initiation of the boys and some tribes conclude it in a few days.

In connection with the initiation into the Bear Totem or group of the northwestern American Indians a very dramatic performance was held. "A lance was prepared which had a very sharp point so arranged that the slightest pressure on its tip would cause the steel gradually to sink into the shaft. In sight of the multitude crowding the lodge

this lance was pressed on the bare chest of the candidate and apparently sunk in his body to the shaft, when he would tumble down, simulating death. At the same time a quantity of blood, previously kept in the mouth, would issue from the would-be corpse, making it quite clear to the uninitiated gazers-on that the terrible knife had had its effect, when lo! upon one of the actors striking up one of the chants especially made for the circumstance and richly paid for, the candidate would gradually rise up a new man."

Strange as it may seem to many of the readers, most of the savages are not by nature very warlike, so that when they feel a conflict is necessary, a war dance or play is indulged in to rouse the fighting spirit. Sometimes the dance is a meaningless one, to the accompaniment of wild cries and shouts. But often they will enact some incident in their history. There is a war play among the natives of Sarawak that shows a high degree of dramatic talent. "It opens with a man seated on the ground picking a thorn out of his foot. He is evidently expecting an attack from an enemy, for his weapons are beside him and he is looking around suspiciously. Finally the enemy is discovered and a conflict takes place. In the course of the fight a sudden plunge on the part of the foe so injures the man that he falls dying. Before finally expiring, he graphically portrays all the death agonies. He has hardly ceased struggling when the enemy grabs the head and cuts it off. While holding up the bloody trophy he suddenly discovers that the man was not an enemy, but his brother. At this point the dancer gives way to a most horrible performance in which he tries to depict the feelings of remorse. In the end

he falls on the ground in a convulsive fit and is attended by a medicine man."

Among many of the savage peoples certain of the plays have lost their serious significance entirely and are retained merely for the pleasure which they give to actors and audience. To an unenlightened spectator viewing for the first time one of these pleasure plays there would appear to be little or no difference between it and the more religious form. In fact the same play may be used at different times for different purposes, and it is only the underlying motive that makes it either religious or secular.

There were a good many of the Indian tribes of North America where the drama for pleasure had reached such a high state of development that they possessed many very modern stage properties and accessories. At one end of the big hall of their council chamber they would have a curtain to conceal the preparations. This probably originated by a man standing up and holding out his blanket. The actors made their exits and entrances through hidden openings in the painted back drop. On the stage were placed various figures which were intended to add to the realism of the scene. The plays dealt with historical events or with incidents of their everyday life. There was usually an accompaniment of singing and dancing.

One play of the Australians shows an incident in the relations between the whites and the blacks. "The first scene consisted in the representation of a herd of cattle which came out of the woods to pasture on the meadow. The black players had painted themselves appropriately to their characters. The imitation was skilful; the motion and behaviour of each head of the herd were amusingly

natural. Some lay on the ground and chewed their cuds. Others stood and scratched themselves with their horns and hind feet, or licked their companions or their calves. Others rubbed one another's heads in a friendly way. After this bucolic idyl had lasted a little while, the second scene began. A band of blacks were perceived creeping up on the herd, with all the precautions which the natives use in such cases. At length they were near enough, and two cattle fell, struck by spears, to the highest delight of the spectators, who broke out in enthusiastic applause. The hunters pretended to skin their prey, dress it, and cut it up —all with the most painstaking exactness. The third scene was opened with a trotting of horses in the wood. Immediately afterward a troop of white men appeared on horseback. Their faces were painted a whitish brown; their bodies blue or red, to represent coloured shirts; and the lower parts of their legs, in the absence of gaiters, were wrapped with brushwood. These white men galloped straight up to the blacks, fired and drove them back. The latter collected again, and a desperate battle began, in which the blacks beat the whites and drove them back. The whites bit off their cartridges, fixed the caps on their guns—in short, went regularly through all the motions of loading and firing. As often as a black fell, the spectators groaned, but when a white man bit the dust a loud shout of joy went up. At last the whites were disgracefully put to flight, to the unbounded delight of the natives, who were so excited that the merest trifle might have changed the sham fight into bloody earnest."

In summing up our conclusions in regard to the development of the drama we see that there have

been three stages in its history. In its first beginning it was used to convey definite meaning at a time when the spoken language was inadequate; in its second stage its purpose was to appeal to the gods and spirits for aid in the struggle for existence or war inspiring; and in its third the religious or serious element dropped out, leaving only the shell: the object of amusing those before whom the performance was given. To the savage this latter stage was of the least importance, for nothing very definite was accomplished by it, but to the civilized man it forms the greatest height to which the drama has yet reached. In these pleasure plays of the savage we are able to get the closest connection between the drama of a low and that of a high civilization.

We turn now to another form of art; namely, the dance, which was very intimately bound up with the drama in the early stages of both. Hence it is impossible to talk about one without mentioning the other. The dance is probably a more primitive expression of human feeling than is the drama. When a child jumps up and down for glee at seeing a lighted Christmas tree; when the members of a savage tribe show their welcome to a returning conquering chief by leaps of joy and the waving of arms, they are laying the foundation for the dance.

Rhythm, which is necessary before dancing can be called an art, is instinctive in man. His heart beats in regular time and his walk is made up of measured steps. Hence when he began to express his emotions by leaps and bounds it was only natural that these should take on a rhythmical motion.

Dancing is classified under two heads, mimetic and gymnastic. In the first of these the motions of

FIG. 114.—A PERUVIAN DANCE WITH MUSIC

From a pottery decoration. (American Museum of Natural History.)

animals and other men are carefully copied, while in the second no natural model is followed. Many of the early dramas are really mimetic dances set to music. Since we have dealt with these, it remains only to speak of the gymnastic. The latter frequently take place before war or at the conclusion of peace, but in themselves have little religious significance. Some tribes will dance at any favorable opportunity, such as the visit of friends, the beginning of a hunting or fishing season, the recovery from illness, or the end of a period of mourning. The dancers, usually in fantastic paint or costume, perform around the camp fire. One writer, speaking of such a dance, says: "It is astonishing how accurately the time is kept; the tunes and the movements are all in unison. The dancers move as smoothly as the best-trained ballet troupe. They assume all possible positions, sometimes springing aside, sometimes advancing, sometimes retiring one or two steps; they stretch and bend themselves, swing their arms and stamp with their feet. . . . The dancers gradually become more excited; the motions become rapid and vigorous; the dancers shake themselves, spring into the air to an incredible height, and finally utter a shrill cry, as if from one mouth. An instant later, and they have all vanished into the bushes as suddenly as they came out of them."

No savage dance is ever held without some sort of a musical accompaniment. At least it is music to the natives, although most of it is quite horrible to the civilized ear and seems to have little relationship with the modern conception of this art.

A great deal of the singing of the primitive peoples consists of the constant repetition of a

few notes. The accompaniment is made by a rhythmic drumming on the ground, a hollow log, or a rolled-up animal skin. This can be kept up for hours during a dance or ceremony. Oftentimes they have words to their songs, or they make them up as they go along. If they have had a successful

FIG. 115.—AN AFRICAN DRUM

One of the primitive instruments of African natives.

day some one will, possibly, make up in the evening such a song as the following: "To-day had we good hunt; we killed a beast. We now have food; meat is good, strong drink is good," and so on indefinitely.

For many of the big dances of the Australians the women form the orchestra and the chorus. They seat themselves on the ground and beat time on a drum made by rolling up a skin, while they sing a monotonous chant. These people even have a leader

who stands in the middle of the circle and beats time with a stick as a modern orchestra conductor would do.

When people advanced to a somewhat higher stage, more notes were added to their songs so that

FIG. 116.—FLUTE PLAYER

An Egyptian flute player of about 2700 B. C.

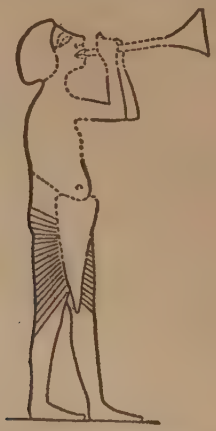


FIG. 117.—A TRUMPETER

Attendant of an Egyptian king of the Eighteenth Dynasty 1375-1358 B. C.

they were able to carry a crude sort of melody. Many of their tones, however, were such that they cannot be written in our modern system of notation. Even in the music of the civilized peoples of India there are some twenty-six tones, while we have only twelve. Hence their songs cannot be transcribed, but must be taught by one person to another.

Though much of the music of the savages is distasteful to the civilized ear, they, in turn, see nothing beautiful in ours. Some of them have been able to learn our songs and after a while have come to like them, but there are others who cannot even re-

peat one of our tones correctly immediately after it is sounded.

An apparent contradiction to the statement that native music is distasteful to European ears is found in the Hawaiian music which has been such a fad throughout the civilized world in recent years. Evidence seems to point to the fact that many years ago the missionaries came to these islands and taught hymns to the people. After they departed the natives retained the music, but added to it their own time. As it was passed on from one generation to the next it gradually changed until it reached the form in which it is

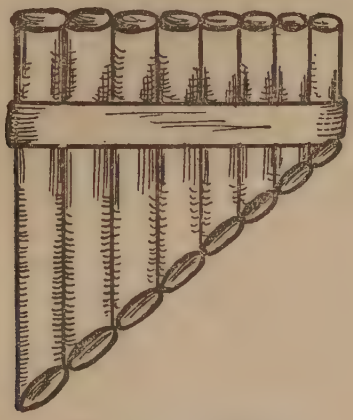


FIG. 118.—PANPIPES

now found. Of course much of the music which is called Hawaiian has been written by Europeans who have taken the time and general form from the natives.

The first musical instrument, and in many ways the most perfect, was the human voice. The others may be divided under three heads, the drum and

beaten instruments, the wind instruments, and the stringed instruments. The drum was probably the first of these, for all primitive dances are accompanied by rhythmic beating of one sort or another. The development has been toward a clear, resonant, resounding tone which is now obtained by tightly stretched skin, but the savage was contented with the beating of two sticks together or the pounding of one stick on a hollow log or rolled-up skin. If these two latter are combined by cutting out a section of the log and fastening the skin across the ends there is made a crude sort of drum.

The child who takes a reed and out of it makes a whistle, and then, by cutting a series of little holes in the side, makes a flute, is going through the same process as the savage who made the first wind instrument. By blowing on this flute and covering and uncovering the holes with the fingers, a plaintive sort of tune can be played, such as we imagine a young shepherd on the hills of ancient Greece would play. When four or five reeds cut in varying lengths to give different notes were fastened together there were made the pipes of Pan, which were closely associated with ancient mythology. It seems a long jump from the simple little instrument to the pipe organ in one of our great churches, yet this is exactly what has happened. Instead of there being a few reeds of different lengths there are hundreds and thousands of all lengths and sizes from a few inches to many feet long. Some are no larger round than a pencil while others are a good many inches in diameter. The little panpipes are blown by the human breath, while the modern organ has a great chamber for compressing the air that is forced through the pipes.

It does not take much stretch of the imagination to trace the development of the other wind instruments. The horns in their name show their derivation and man obtained his first one from his cattle. Thus, starting with the flute made from a reed, and the ready-made horn, we come down by simple steps to the clarinet, oboe, bassoon, French horn and so

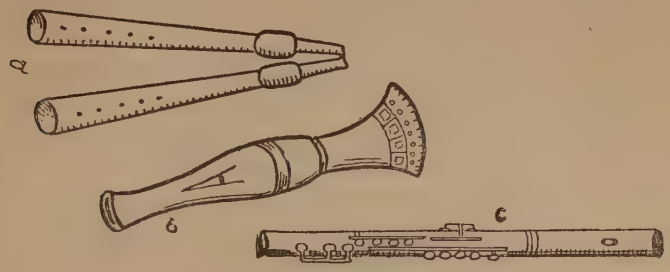


FIG. 119.—FLUTES

(*a*) Ancient Greek; (*b*) Egyptian; (*c*) Modern.

on through the other wind instruments of a modern orchestra. The bagpipe, which is confined almost entirely to Scotland, was first made by fastening to a pipe a wind bag which, when pressed, forced the air through, thus making the sound that is so dear to the Scotch people.

The stringed instruments can be carried directly back to the bow of the warrior. The arts of peace and war seem here to be combined. We can readily picture the savage enjoying the faint note that is sounded by striking the taut string with the arrow or other stick. The Zulus, who regard with disdain the bow as a weapon, still keep it as a musical instrument. A ring is placed over the string and slid up and down to alter the tone, while a hollow gourd is held against the bow to act as a resonator or intensifier for the otherwise feeble sound. The

harp that was used in ancient Egypt was made by adding several strings of different lengths to the bow, and making the wooden back hollow instead of solid to act as a sounding board. Most of the early harps were made in this way, but it was difficult to keep them in tune for the back was continually bending. To avoid this difficulty a front pillar was put on, and when this was done more strings were added until the big harp of to-day was reached. In all of these the strings are plucked with the fingers.

The first key instrument that resembled the modern piano was called a harpsichord. It consisted of a harp placed horizontally with a keyboard in front of it. When a key was struck the wires were plucked by small metal fingers. In the next instrument or clavichord the wires were struck by hammers as is done in the piano. This meant that the tone could be sustained, a thing impossible in the earlier form. Pedals were early introduced to enable the player to make his music loud or soft as he chose. As the development went on more octaves were added, and better sounding boards were put in, bringing out the richness of tone.

The stringed instruments that are represented to-day by the violin, the cello, the guitar, banjo, and the mandolin, were originally made by stretching strings over a hollow gourd and later by adding a neck, in order to give the strings greater length. There are numerous savage tribes to-day whose musical instruments have advanced no further in their development than these latter which we have just mentioned. The people, however, seem to get much pleasure out of them, and a man will sit for hours strumming on a single string, singing a song of his own composition.

From music, let us turn to poetry. This art may be divided into three parts: lyric, epic and dramatic. Possibly the simplest and the one which occurs with the greatest frequency is the lyric. Poems of this sort are usually set to music and are supposed to express the individual emotions of the poet. Nearly

FIG. 120.—MUSICIANS OF EGYPT

The figure at the right is from El Kab, Twelfth Dynasty (about 2000-1788 B. C.). It represents a girl playing a small harp. At the left is a group of three musicians, drawn from a wall painting of about 1425 B. C. The first plays a double flute with two finger holes; the second plays a three-stringed lute; the third has a harp of fourteen strings with a sound box covered with leopard skin. (Metropolitan Museum.)

every savage will make up songs to suit his mood, most of which are forgotten as soon as they are uttered. One writer says: "To an old Australian his song is what a quid of chewing tobacco is to a sailor. If he is angry, he sings; if happy, he sings; if hungry, he sings; and if he is drunk, provided he is not dead drunk, he sings more lustily than ever."

Most of these songs or poems are interesting rather than beautiful and many of them can only be classed as poems because of the rhythm which the music gives them. There are examples where a tribe will sing a song, the words of which are entirely unknown to them, for the pleasure which they get from the form and sound. The Australians will repeat and transpose words so as to sing pure nonsense in order to vary or maintain the rhythm. Here we can conclude that the musical character is more important than the poetic meaning.

Some of the simplest forms of the lyric are as follows. The tired traveler will sing:

I'm tired with my journey.
Through all the yerna hither
It was a never-ending way.

The hunter will tell of the day's sport in this song:

The Kangaroo ran very fast,
But I ran faster.
The Kangaroo was fat,
I ate him.
Kangaroo! kangaroo!

The warriors before a battle will rouse themselves to fighting pitch by singing as they dance around their fire:

Spear his forehead,
Spear his breast,
Spear his liver,
Spear his heart,
Spear his loins,
Spear his shoulders,
Spear his belly,
Spear his ribs.

and so on until they have condemned every part of the body of each enemy.

A GREEK STATUE
(Louvre, Paris)

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MAORI (NEW ZEALAND) CHIEF AND HIS TOTEM POLE

When one of the natives of Australia sailed away to England his friends sang:

> Whither wanders the lonely ship?
> I shall never see my dear one again!
> Whither wanders the lonely ship?

Most of the native songs deal with the material things of life and some one has said that "their lyric inspiration is quite as often of the stomach as of the heart." The two subjects with which most of modern lyric poetry deals, namely romantic love and the beauties of nature, are almost unknown among the savage peoples. This is not surprising when we realize that love as we know it is seldom experienced by them. Nature to them is a hard taskmistress under the lash of whose whip they are forever laboring and hence they see in her nothing great or beautiful.

It is doubtful if the epic, or long narrative poem appears to any extent among the savage peoples. Certain it is that the great epics which later appeared among the Greeks, the peoples of India, the early English, and the Scandinavians, were unknown on the earliest stage of civilization. It is true that the primitive peoples had all the material for such poems, for they made up stories dealing with the adventures of their heroes and recounted these around their camp fires at night. To these stories of events they also added tales of the intervention of gods and spirits in human affairs. What they lacked was a great enough man who could take all this material and out of it produce a poem that would bear the same relation to his group as the Iliad and the Odyssey did the Greeks, the Song of Roland to the French, and Beowulf to the English.

The last form of poetry to be developed was the dramatic. The savages, of course, had their plays and dances, but these were usually given in pantomime with a musical accompaniment. Where words appeared they were sung, but they were entirely incidental to the action. It was not until a high stage of development was reached that we find appearing any of the poetic dramas or dramatic poems.

Poetry of all kinds has played an important part in giving us much of the history of early peoples. We divide the age of man on the earth into two parts, the historic and the prehistoric. The former began when written records could give us authoritative information as to the way in which the people lived and something of the chronology of events of their time. Before man began to write things down, traditions and stories were passed on by word of mouth, from one person to another, from one generation to the next. Around the camp fires at night the old warriors would tell to the young the stories of their own deeds of bravery and prowess. By the time the children had grown to youths and the youths to men they had absorbed so much of the lore of their people that when their time came they, too, could tell their offspring the same things around the same camp fires. And so the history of a people would be passed on in this way. In all probability the original tellers made themselves out to be great heroes by adding some details and suppressing others. Each one in turn who told the stories added some things from his own imagination and left out others. The result was that after many generations of additions and subtractions the stories bore little resemblance to the original

events, and hence as history were of little value. When the people began to put the history of the events that made up their everyday life into poetic form, means had been found for passing on the story in an unchanged condition. This was frequently done to celebrate the victorious homecoming of some chieftain. A song would be made up in which his deeds of bravery were set forth. The poet-singer would probably add details which would make him out a greater man than he really was.

In the Middle Ages in Europe, when forms of entertainment were scarce, there traveled from town to town and from castle to castle the minstrels. These men were constantly making up songs and stories to amuse the people and they would take for their themes any of the important events of the day. It frequently happened that a noble would support one or more of these men at his court in order to bring some joy into an otherwise rather dull existence. If the lord was warlike or a sportsman the minstrel would sing of his deeds on the battle field, or in the tournament or hunt. As the length of time that the singer lived at the castle depended on the favor of the noble, it behooved him to keep in his lord's good graces by flattering his vanity. This he did by praising all deeds in the most fulsome manner. While the result was favorable to the minstrel, yet as history it was of little value. Many of these songs have been retained. Although their face value must be discounted, enough of truth remains to give us a fairly good picture of the life at that time.

The story of the wanderings of Odysseus and his experiences among gods and men as told by Homer in the Odyssey were never intended to be history.

He wrote to interest and amuse the people by taking characters popular in legend and around them weaving an exciting romance. There is, of course, a possibility that there was a king by the name of Agamemnon and that the city of Troy was really besieged, but the thread of history is so slight that we must ignore it entirely. This does not mean, however, that the poems are not of inestimable value in picturing for us the Greek life at that time. The author, in order to give his story an air of reality, placed his characters in the environment which all the people knew. This, of course, was incidental to the main theme, but it is from this setting that we are able to reconstruct the history of the Greek civilization. We see the people at everyday tasks in homes, in the market place, and on the sea.

"Thus following the romantic fortunes of the many-wiled Odysseus, we see as in the scenes of a dissolving view how the heroes of old days went spear in hand with their swift dogs at their heel, how at the house door they threw aside their garments to go into the bath chamber, and came forth anointed with oil to the feast, where, with no such refinements as plates or knives, they ate their fill of roast meat and cakes of bread; how they diverted themselves with throwing quoits on the smooth turf, or lounged on outspread hides in the sunshine playing merels; how in solemn rites they poured the libations of dark wine and burned the meat in sacrifice with prayers for what their hearts desired, yet knowing all the while that the gods would, as they listed, this grant and that deny. All this is not only history but history of the finest kind."

We have now, briefly, covered the early development of the aesthetic arts or those dealing with the

beautiful. All of them occur in some form among the primitive peoples, and, like the other things of our civilization to-day, they moved slowly from the simple to the complex. Painting, sculpture and the drama had their origin in the fundamental human desire to imitate. The gymnastic dance probably arose through the exuberant spirits of the peoples seeking outward expression, and singing came from the natural inflection of the voice. Poetry was first made by people putting words to their rhythmic music, and the musical instruments began from beating on the ground, twanging a bowstring, and blowing on a hollow reed.. There are no peoples so low in the scale as not to have some of these arts, and on the other hand, the human mind can reach no greater height than the realm of music, painting, sculpture, writing, and the drama.

CHAPTER XVI

RELIGION

TO many people religion is typified by forms, ceremonies, and great cathedrals with music and elaborate services. To others it is a matter of the heart, or the union of man with the unseen powers. Still others regard it as an all-propelling force that is driving the world on to ultimate perfection. But whichever view is held, whether it be the simplest or the most ritualistic, we must not forget that there was a time when man had no conception of anything higher than himself. The unseen, unknown world of the spirits was as far from him as it is from all the other members of the animal world. There must have been a time, however, when there slowly dawned on his ever-developing mind the germ of the idea that was later to give rise to the religions of the world. There is no evidence to prove that the first man had an inborn religious sense, nor can we accept the statement that man did not become a human being until there came to him a conception of a soul and of supernatural powers and forces greater than himself.

What we want to try to do, is to take up the beginnings of religion and to trace the various forms as we find them among the savage peoples to-day. It dominates the lives of most of them, for through its agency they try to ease the struggle for existence. Hence it shows at this early stage a low materialistic conception rather than a high spiritual one.

When the mind of primitive man had developed to the point where he could reason with some degree of accuracy and could expand his thoughts beyond mere animal satisfactions, he began to ponder on certain things that were not obvious. To the man of to-day there are at least two great mysteries—life and death. But to early man the latter was the only one of interest. The tiny baby just born into the world was too small and helpless to provoke more than a passing thought. The savage could crush the life out of it with one hand, and as strength and not weakness appealed to our early ancestors, he looked upon the beginning of life with indifference.

Death, on the other hand, with its close allies, swoon and sleep, caused the savage much serious thought. We can draw a fanciful picture that has in it much of real truth. Let us suppose that a certain very primitive man has been in constant terror all his life of another member of his group who was stronger and more powerful than he. Suddenly one day a rock rolls from the cliff, strikes the stronger man on the head and kills him. This has all been witnessed by the other man who does not understand why his enemy is lying so still on the ground. He finally gathers enough courage to approach him slowly, for he fears that he may be shamming. Nearer and nearer he comes to him until he is standing beside him, but the man never moves. Cautiously he touches him, half expecting to see him jump up and wield the big club. He is even able to kick him without any retaliation. Something has happened to the bully which makes him absolutely harmless. Naturally the savage man thinks as he has never thought before.

Possibly at some other time he sees a man knocked to the ground by a blow and he remembers his old enemy. However, this second man after a period of time slowly moves and gets up, wondering how he happens to be in that position. And again the savage thinks. Here were two men, both, to all casual appearances in the same condition, yet one never moves again, while the other, after a time, rises to his feet and walks off.

From his earliest days the savage has noticed his own people asleep around their camp fires; he realizes that while in this condition they appear to be not unlike the dead man and the one in a trance or swoon. What caused any one of these states he did not know, but he felt that there must be some close relationship existing between them. What he did know was that from the condition of death a man never recovered, but from the other two he came back after a time.

In order to find out how the idea of the soul or spirit first dawned in the mind of the savage, we must turn to his dreams. After the death of the powerful man, whom we mentioned above, his body was buried in the ground or disposed of in some other way. The little man who feared him had either helped to dig his grave or had witnessed the burial of the body. That night and many succeeding nights, after he went to sleep, he met his old enemy who was just as powerful and just as brutal and chased him just as far as he did when he was here. In fact, the whole thing was so realistic that he would tell his friends that he had seen the big man and that he had beaten him over the head with his stick. But his friends told him that he had not moved from the spot all night and that no one had touched him.

To him his dream experiences were as vivid as those of his waking life, in fact he was scarcely able to distinguish between them. However, his reasoning was something like this: "When a man is dead the thing which animated him during life is gone. When I sleep I see this man whom I know is buried, therefore, it must have been that which departed at death that I have really seen. But I have not moved from this spot and yet I have had all of these adventures. Hence my animating spirit, which can be detached from the body temporarily during life and permanently at death, has gone forth in sleep to have various experiences."

Having once firmly established in his own mind that a man is made up of two parts, the body and the soul or spirit; and having determined through dreams to his own satisfaction that at death the spirit lives on, the savage man had laid the basis for the religious conception. Until this idea was clearly established it was not possible for primitive man to have any ideas regarding a spirit world.

There are some writers who hold that the savage was so awed by the greatness and majesty of the things of nature that he began to worship them and the forces that caused them. Anyone who knows the savage realizes that he takes his environment as a matter of course and that he sees no beauty in it. It is very dangerous to try and interpret primitive life on the basis of what we now feel and think. Because we are inspired by a wonderful sunset or a great waterfall it is no sign that the early savage looked at them with any such emotion. In fact, for him the sunset marked merely the end of a day of hunting and the waterfall a thing to be avoided. But to return to the ideas regarding the soul.

According to different peoples, that which departs at the time of death is situated in various parts of the body. One of the commonest locations of the soul is in the breath. It is not hard to see how this idea was reached. When a person dies the breath ceases and hence the soul must have been there. This thought has persisted even among the more ignorant civilized peoples. When a mirror is held to the mouth of the living the glass is dimmed by the breath, but the mouth of the dead leaves it unclouded.

The Greeks thought of the soul as in the blood, for when a man was wounded his life seemed to flow out on the field of battle. The negroes, together with other peoples, think that the soul is in the shadow, for they see this following them around all day. When a people have this belief they will avoid walking in the shade for fear of losing their shadow. The negro thinks that an alligator may pull a man into the river by seizing his shadow, and murders are committed by secretly driving a nail or a knife into this intangible soul. In the modern child's story of Peter Pan the hero loses his shadow, which is found by two children who put it in a bureau drawer. Peter returns to get it. When it is finally fastened to him again he is happy, for he has found his soul.

Some tribes consider that the soul is in the eye. If a man will look at another person carefully he will see there reflected in miniature his own image. But if he will look into the open eyes of the dead there is no such reflection. Hence the savage reasoned that the little person seen in the eyes of the living was the man's soul which left him at death. This same idea is found where people think that

the reflection seen in the water is the soul of a man. In a good many tribes, individuals will not allow their photographs to be taken for fear that their souls can be injured by the person having the picture.

It is only a step from the idea that man has a soul, to the conception that everything in nature and every tangible object on the earth possesses one of these spirits. When a man dreams he sees clearly the various environments with which he is familiar. He goes out hunting animals armed with his spears and bows and arrows—on the way he meets an old enemy with whom he fights. In fact, the things which he sees and does are an exact counterpart of his everyday life. When he wakes he learns that he has not moved, that his weapons are still in their corner, and so he reasons that he must have used the spirit of the weapons, to kill spirit animals in a spirit land.

There was still another line of reasoning which strengthened the impression of the savage that all things had a soul. When a man is alive he moves, when he is dead he does not, hence all things in nature which move, such as the leaves on the trees, the grass, the water, must have within them the same sort of thing which animates man. As time went on spirits were attributed not only to all moving objects but also to every rock, piece of wood, mountain, in fact everything in the world.

When a man died his soul left his body. At first his friends tried by every possible means to recall it, for they knew that as a man awoke from sleep the spirit returned. They assumed that the soul was wandering and that it could be brought back. The name of the deceased was loudly called and favorite

food was placed near the body. It was only when putrefaction started in that they realized that their efforts were in vain.

There is a very close analogy to this feeling, among those people who fear to wake a sleeper suddenly. They think that the soul may be away in some distant place and, as it cannot return at once, it will stay away altogether. The negroes say that the spirit escapes through the mouth of a sleeper and that if a person keeps his mouth open some strange soul may take up its abode in the man and cause all sorts of trouble. Other peoples will not turn a sleeping person over for fear that the returning soul cannot find the entrance to the body and so will depart for ever.

There are a variety of beliefs as to the location of the next world. Some think that the spirits stay in the neighborhood of the place where they have died, for in dreams they appear to be in the familiar environment. Certain African tribes say that a man dreams only of those with whom he has been acquainted, hence when the dead have passed from the remembrance of man they disappear, but where they go is unknown. A good many people think the place of departed spirits is on some neighboring mountain top which no one has climbed, or in some depth of the jungle, or deep in a cave whose existence is just known, but into which no one has penetrated. This latter belief has led to the location of the next world underneath the earth with the cave as the entrance. Another gate to this place is the hole through which the sun slides as it sinks into the west, and so at nightfall the dead pass from this world into the next. It is quite common to picture in detail the life after death, but the place is some

far distant corner of the earth or sky where no living person has been.

Most peoples have some conception of a future life, regularly patterned after the life on this earth. By allowing their imaginations to have full sway they are able to make conditions there as they would like to have them here. There are no hardships or cares or worries, but life flows by as a placid stream. In the Happy Hunting Ground of the Indians there is plenty of game and many weapons with which to kill them. The Eskimos picture a large mud hut with numerous rotting seal heads under the benches to eat, and splendid hunting grounds outside with much game and continual sunshine. The Zulus say that the dead go down to the underworld by holes in the ground. There are found mountains, lakes, rivers, and the villages filled with their kinsfolk who are tending the cattle which have come to life after being killed on the earth.

There are few uncivilized peoples that have more than one place of departed spirits and usually this is a sort of heaven and not a hell. As they can picture whatever they want, they would not be clever if they made this place uncomfortable.

There are two beliefs regarding the disposition of the spirit that it is important to mention. The first is that the souls of the dead are reborn again on this earth in human beings. This is called Reincarnation. The other is that souls of people return again in animals. The name given to this is Transmigration.

Some tribes refrain from eating the flesh of a particular species of animal, for they think that the departed return to take up their abode there. It is probably for this reason that we find animal worship

playing such an important part in so many of the early religions. But it is not confined to the lower order by any means, for the Hindus will not eat or kill any animal for fear of destroying some ancestor. They will even allow tigers and snakes to kill half a village or an entire herd of cattle without so much as raising a finger to stop them.

Where the belief is strong that the souls return as other people, when a child is born his parents try to find out which of their ancestors he really is. They mention aloud the names of all those whom they can remember, and then if at any one the child makes a sound, they say "Thou art come," and call the child by that name. Negroes in slavery have been known to commit suicide with the hope that they would be born again at home among their own people. Many of the dark races, unable to account for the appearance of the white race, assumed that the dead returned in that form. The savages of Australia express this idea in a simple formula, "Black fellow tumble down, jump up white fellow." A native who was hanged in Melbourne for some crime, was quite cheerful, for he said that he would return as a white fellow with plenty of sixpences.

Among some of the higher races there is the belief that the kind of life led by a man on this earth determines the form in which he returns. If he has been good he will be reborn as a better man, but if his life has been evil he may come back as a lower animal. The ultimate goal toward which all the people of the Buddhist faith are striving is called Nirvana. This means the end, or the absolute annihilation of the soul, a state in which there is no more transmigration.

As we have said earlier in the chapter, the most common belief is that the life in the next world is a continuation of the life on this earth. If a man was a ruler here he will be a ruler there, and therefore it is necessary to send his belongings with him on his journey. If he were to arrive without any tools or weapons or food, the people on the other side would not think that he was a very important personage while he was on earth. Thus it is the custom in some places to burn the house, tear up the fields, cut down the fruit trees, and place on the grave all the movable property of a man. At times even the wives and slaves are slaughtered so that they may attend their master in the next life. All this is, of course, based on the theory that every object has a soul of its own.

So deeply imbedded in the minds of some people is the idea of the continuance of life in a place much happier than this earth, that wives, of their own accord, will kill themselves on their husband's grave. In India the custom of *suttee*, where wives threw themselves onto the burning funeral pyre of their departed mate, was abolished by the British.

The Eskimos bury the head of a dog with the body of every child. As the dog is man's friend he will guide the wandering spirit into the land of the dead.

It is interesting to note in this connection that there are some tribes who, the missionaries claim, have no religion, but who put food on the graves of the dead. This means that they believe in a future life and hence in a spirit world. Thus, however slight their outward observance may be, they must have at least the germ of religious thought.

As people advanced up the scale of civilization they came to realize what an enormous economic loss

it was to sacrifice all the property of a man on his grave. Most of the possessions represented capital and without this no group can advance very far in social development. Where trees and fields and weapons and tools were destroyed, a man's son had to start at the very beginning to collect all of the things necessary for life. This meant that he was using valuable time that might have been devoted to advancing his civilization, in remaking the things which his father had possessed.

When the realization of this became deeply implanted in the minds of the people they began to change by putting on or in the grave only a few of the tools and weapons of a man. Later they put only a little dish of food. The Chinese have argued something like this: "It is the spirit of the article and not the article itself that goes into the next world. Hence if we make all of the necessities out of paper and burn them on the grave, the same result will be accomplished as though we destroyed much real property." Thus at a funeral, paper houses, furniture and money are burned to help the departed in the life beyond the grave, while the real articles are given to the living. They even have paper men and women whom they burn with the other things.

There are several interesting survivals of this custom of grave sacrifice in parts of the civilized world to-day. Where a king or a great general dies it is customary to lead his horse and his dog behind the casket to the grave. In the old days both would have been killed there. At the Irish wake, a piece of money is put into the hand of the corpse to pay for crossing the river.

The mind of a great many of the savage peoples is so constructed that they cannot conceive of death

as due to a natural cause. In other words, a person who is ill is in that condition because of an evil spirit sent there by an enemy. Hence after death it is necessary to find out the name or tribe of the offender and punish him for murder. One means of doing this is for the nearest male relative to sleep the first night with his head on the corpse. If he dreams, the spirit of the dead man is supposed to have told the name of the culprit. Another method is to put a live insect on the grave and watch the direction it takes in crawling off. If it goes toward any one of the people there assembled, he or she is guilty, but if the way points toward a neighboring tribe, it is a signal to start on the warpath. In some places the mourners are carefully watched, and if anyone does not seem to be expressing his grief in a loud enough manner, he is accused of being glad the person is dead, and therefore of being the cause of his death. The noise at a savage funeral can well be imagined where everyone feels that he may be accused of murder unless he expresses his grief in unmistakably loud terms.

Among savages, after a person has died and all the known means have been applied to bring back the spirit to the body, preparations are made for burial. It is supposed that the ghost of the departed stays around the hut until the body has been taken out, and even then it may return. An unattached spirit is a thing quite horrible to all savage people and various means are used for driving it off. Frequently after a death a house or even an entire village is abandoned. One of the commonest means of getting rid of a spirit is to take the body out through a hole in the wall of the house—this is then closed so that if the spirit should return it could not find

its way in again. The Eskimos not only do this but also put all of the possessions of the dead man out of the house for a time. As the body leaves, a woman waves a burning piece of wood around in the air shouting, "There is nothing more to be had here." These same people fear to touch the dead lest they become contaminated. The dying are even dressed in their grave clothes and sometimes laid beside their open grave so that after death very little handling is necessary in burying the body.

Most uncivilized peoples dispose of the body as soon as they can after death. While preparations are being carried on, they make as much noise as possible by beating drums and yelling so as to drive the spirit away from the house and village. There are some tribes who proceed to the grave in an orderly fashion, but having once placed the body in the ground, the members all start running in different directions. The idea is that the spirit becomes confused, does not know which one to follow back to the village and hence does not follow anyone.

Some tribes have the custom of eating the bodies of the dead. The primitive reasons are various. Some argue that the dead can have no better tomb than the bodies of their relatives. Others expect to take over the strength, or courage, or cunning of the particular person whose body is consumed. And still others hope that they can acquire by this means a guardian spirit who will ward off all evil.

Having briefly treated of the dead and some of the ideas concerning them, we must take up the deeper significance of these thoughts in their application to religion.

As we have said, every person, according to the peoples on a low stage of civilization, has a spirit

which departs at the time of death and either takes up its abode in the neighborhood or goes on to some other world. These souls retain personality as long as the memory of a few generations lasts. After that time they become dissociated from any individual and take their place in the great mass of the spirit world. These are the ones who, according to the savage, take up their abode in all animate and inanimate objects in the world.

Before going on with this thought we must pause for a moment to speak of the savage method of reasoning. Our earliest ancestors were not able to connect cause and effect. This was due entirely to their lack of knowledge of any of the fundamental laws of the universe. A thunderstorm was to them the anger of the gods, great droughts or excessive rains were sent as punishment upon them, sickness was the work of an evil spirit, poor hunting or fishing was attributed to some bad influence, and so on through every detail of their life. One strange thing about the workings of the savage mind is that starting from a wrong major premise to reason, each step after that is perfectly logical. Of course the ultimate conclusion is wrong, but that is of little consequence to the savage. He has satisfied his own desire for an explanation. It seems strange to us that where there are two possible explanations to account for a thing not immediately verifiable, one perfectly obvious and the other very obscure, that the savage should every time take the latter. For instance, he is out walking in the woods and stubs his toe on a stone lying in his path. He attributes this not to the fact that he did not raise his foot high enough, but to the evil spirit in the stone which tripped him.

When the theory finally evolved that everything had a spirit, the primitive man had then a ready argument for any or all occurrences. He could blame the spirits. The life of the average savage group is filled with more hardships than pleasures. To account for these they divide the spirits into two parts, the good and the bad. These latter cause all the trouble, but the joy in life is not laid at the door of the good spirits, being due to the momentary inactivity of the bad.

The major portion of the religion of all the primitive peoples consists in attempting to keep in the good graces of the bad spirits. The argument advanced is that the good spirits will do no harm and hence there is no reason for paying any attention to them. The evil spirits, on the other hand, will always do harm if they are not pleased, and thus to ease the struggle of life the people worship and sacrifice to them.

It was out of the worship of ancestors that man finally came to develop the idea of the gods. As we have said, the general conception of the next world is that life there continues as it was on this earth. The rulers here become the leaders there. If the power of a mighty relative was feared on this earth, how much more should it cause terror when he passed to the other side, for the great man then ruled over two worlds? When he was alive his relatives could avoid his anger by keeping out of the way of his weapons, or by escaping into the jungle. But after he dies he cannot be avoided, for he may be anywhere at any time in his unseen form. It is little wonder, then, that the savage should worship these ancestors and deify them. He does not regard them as disembodied spirits with no form, but he

pictures them as they were on this earth. In other words early man creates his own gods in his own image. Even more than this, he attributes to them all the human passions, and wants, and he supposes that they still retain their old likes and dislikes. He feels that they are dependent upon him for much of their sustenance in the next world and so for that reason he sends all their belongings after them when they die. He constantly sacrifices food and drink to them so that they will not suffer. This he does without any sense of devotion, but rather with the idea that if they are not satisfied they will visit all sorts of trouble upon him. A savage motto might well read, "Do unto your ancestors as you would they should do unto you." Thus he regards his religion almost as he does his hunting and fishing.

The Chinese are still the great ancestor worshippers of the world. Each family has a room in the house in which there is a shrine to the departed and here sacrifices are constantly made. No event of any interest or importance takes place in the family unless the ancestors are informed. In return for all this they watch over and guard their descendants from all evil.

At first these ancestral gods were very personal and belonged to only one family. Later, when the tribal chief was the recognized ruler, he became after death the god of the tribe. In time there would be a good many dead rulers for each group, but only the later ones were remembered by name. Gradually, in the evolutionary process, there came to the mind of man the thought that one of these gods was more powerful than the others. Possibly this conclusion was reached by comparing the social order in this world with that of the next. There is

usually only one supreme ruler in each savage tribe, although he may have some assistants. Hence in the other world there can be but one head, but there may be numerous lesser gods.

Most of the early peoples, while considering their god to have human form, connected him closely with some important natural element which influenced their lives. Thus, many of the agricultural peoples worshipped the sun as their supreme deity, for through him their crops blossomed forth. If they were living in an arid region the rain was their chief god. Those who were living on the coast and depended upon the sea for their livelihood regarded the sea god, or the wind god, as the governor of their destiny. The Polynesians had two wind gods, a brother and a sister. "Hurricanes, tempests, and all destructive winds were supposed to be confined within them, and were employed by them to punish such as neglected the worship of the gods. In stormy weather their compassion was sought by the tempest-driven mariner at sea, or the friends of such on shore. Liberal presents, it was supposed, would at any time purchase a calm. If the first failed, subsequent ones were certain of success. . . . Whenever the inhabitants of one island heard of invasion from those of another, they immediately carried large offerings to these deities, and besought them to destroy by tempest the hostile fleet whenever it might put to sea."

The conception of two divine personages ruling the universe either at different times or over different things is not uncommon. The sun and the moon, in some places, rule together, the one by day and the other by night. The earth god and the sky god are frequently worshipped as the two supreme

beings. Usually these dual divinities are not of the same sex and are regarded either as husband and wife, brother and sister, or entirely unrelated, but much interested in each other.

By the time the Greeks had reached the height of their cultural period, they had combined the religious ideas of many other peoples. They had one supreme divine ruler, Zeus, who was entirely detached from all things such as the sun, moon, or earth. He was surrounded by a vast number of lesser gods and goddesses who governed various parts of the universe. There were also divinities who controlled human emotions and attributes such as love and beauty, and to them humans turned for help.

This great group of gods lived on Mount Olympus, where their life was much like an earthly existence. They loved and hated, they plotted and schemed, they fought among themselves and would sometimes come to earth to take part in human affairs. When they were among mortals they disguised themselves as men and women, or in some other form which would make recognition impossible. It was partly for this reason that the Greeks were so kind to strangers, for they never knew when they might be entertaining one of the gods unawares. Most of the gods and goddesses had their own temples, where their particular followers worshipped them and offered sacrifices. If one goddess thought another goddess was getting more attention than she, her natural female jealousy caused her to create much disturbance on the earth until everyone knew she was angry. If she could not do it herself she would enlist the aid of one of the gods, who would hurl destruction upon suffering humanity.

As Greek culture declined and Roman civilization rose to the top, many of the gods were taken from Greece to Italy. There Zeus became Jupiter, but his powers remained the same as they had always been. He surrounded himself, or rather the people surrounded him, with a host of lesser gods whose life ran in the same channels as in the place of their creation.

Up to this point in the development of religion the gods have merely been very large editions of human beings. They had few of the nobler qualities that go to make up the modern conception of the Deity. They cared for man only because he sacrificed to them and they were ever ready to send death and destruction in a fit of anger. Most of them were evil gods, so that when the form of God changed from the old materialistic to the spiritual, a great step forward in religious thought had been made. Some one has said that "an honest god is the noblest work of man," and this better than almost anything else characterizes the difference between the old and the new.

When the conception of a good God had dawned in the human mind it was then necessary by some means to account for all the sickness and trouble in the world. All of these could not very well be attributed to His divine anger, and so there came into being the ruler of the evil. The earth became a great battle field where the powers of light and darkness, or good and bad, were forever striving for supremacy.

Let us look now at prayer and sacrifice as they occur among the lower orders of man. Religion, in general, to the savage man is merely a means of making life somewhat easier. There is no thought

whatsoever of any relationship between the kind of life a man leads during his sojourn on this earth and his status after death. Likewise we find that at this early period religion and morality were two quite separate things. As we have remarked before, the life in the next world is a continuation of the existence on this earth. While the spirits live as they did when here, yet they have a very vital part in controlling human destinies. They can, however, be praised and flattered, they can receive gifts and in turn grant favors. In other words, the savage regards them as he would his own powerful rulers. He has no love for them, but he fears them for the evil that they can do. When he wants his earthly chief to help him, he first gives him a present of food or weapons or ornaments to make him happy, and he then makes his request. According to the savage reasoning, if this method proves so effective with the living, it will surely prove equally so with the dead. To express this in its boldest terms, it is a straight bargain. Most of the savage prayers begin with the statement of what the offering is and then the request is added. It is like the savage who says to the chief: "Here is a deer which I killed for you. Take it, but in return I want your protection from an enemy who is seeking to kill me."

It is interesting to quote a few savage prayers that illustrate this point. The natives on the Samoan Islands, when they drink their ava at the evening meal, pour a little on the ground and say: "Here is ava for you, O gods! Look kindly toward this family; let it prosper and increase; and let us all be kept in health. Let our plantations be productive; let food grow; and may there be abundance

of food for us, your creatures. Here is ava for you, our war gods! Let there be a strong and numerous people for you in this land.

"Here is ava for you, O sailing gods (gods who come in Tongan canoes and foreign vessels)! Do not come on shore at this place; but be pleased to depart along the ocean to some other land." The Papuans say: "Compassionate father! Here is some food for you; eat it; be kind to us on account of it." A certain Indian tribe frequently traveled a river where at one spot there was very swift water. As many had been drowned there, it was thought a spirit occupied the rapids, and so the following prayer was uttered as the canoe came to the place: "O, thou god who dwellest in this spot, accept this tobacco; help us on our voyage, save us from shipwreck, defend us from our enemies, give us a prosperous trade, and bring us back safe and sound to our village."

One of the war songs of the Delaware Indians is a prayer to the Great Spirit:

"O Great Spirit there above,
Have pity on my children
And my wife!
Prevent that they shall mourn for me!
Let me succeed in this undertaking,
That I may slay my enemy
And bring home the tokens of victory
To my dear family and my friends
That we may rejoice together—
Have pity on me and protect my life,
And I will bring thee an offering."

The special interest in this prayer lies in the last line. In all the other prayers which we have quoted the offering is made first with the request following. In this one the Indian turns the bargain

around and says, "If you will grant my requests, then I will pay you for them."

There is another element in the prayers of many primitive peoples that it is important to mention. The gods are thought to be very vain, and like human beings should, therefore, be praised. A great number of the petitions start with a statement of the greatness and the power of the gods. Having thus put them into a happy frame of mind the savage tells them what he wants. When this method is adopted it is not always necessary to add material sacrifice, for like the human counterparts they are "pleased with a rattle, tickled with a straw."

What we know as sacrifice to the gods can be traced back to the gifts made to the recently dead, and to the custom of burying the property of a man with him.

As we have seen, the gods were at one time human beings and in the next world lived as they did here. Hence the sacrifice was usually made up of such things as food and drink. Usually the amount given depended upon the size of the request. Oftentimes the economic loss in the sacrifice was enormous, especially among the more civilized peoples. Rameses of Egypt, for instance, at one time sacrificed 30,000 bulls.

This brings us to one of the very incongruous things in the early religions. While the gods and spirits were thought to be all powerful and all knowing, yet the people were continually trying to fool them. The Greeks, at times, instead of sacrificing an entire animal, would place on the altar the entrails, bones, and other uneatable parts, and then over the top would put some strips of good

meat. Behind this was the thought that the gods would look down, see what appeared to be an altar covered with fine food, and feel perfectly satisfied.

Sacrifice by the primitive peoples is given not only to the gods, but also many of the lesser spirits come in for their share of it. The savage man who stubs his toe over a rock in his path will pour a little oil on the ground and ask the spirit not to seize him again. Before eating or drinking a little food or wine is put aside for any stray spirit who may happen to be in the neighborhood. The savage argues that it is not safe to neglect any one of them, for there is no telling what future harm may come from an omission.

The average savage man is not content with the aid received from the family and tribal gods. He wants an individual spirit to look after him personally, in return for which services he will feed it and offer it other sacrifices. These spirits may reside in any inanimate object, and so the savage will pick up a curious stone, a queerly shaped piece of wood, a bright shell or some part of an animal. Possibly he will make an object out of wood or by taking a piece of wax and sticking feathers and other things into it. Such a thing is called a fetish, and a man regards it as his most precious possession.

There are some peoples who will always go to the priest or medicine man in order to get a fetish, for he is supposed, by his magical power, to be able to obtain a more powerful one. An American Indian youth goes out and fasts for days in the mountains, until in an exhausted state he dreams of something. It may be an animal or a part of one or even a plant, a knife, or a pipe. This becomes his special guar-

dian spirit and he would readily kill any man who tried to take it from him.

If, after obtaining a fetish, a savage meets with many misfortunes he at once blames the spirit for not being attentive. He will scold it and if this does no good he will whip it as one would a child. If luck is still against him, he throws it away and gets another one. "The fetish can see and hear and understand and act, its possessor worships it, talks familiarly with it as a dear and faithful friend, pours libations of rum over it, and in times of danger calls loudly and earnestly on it as if to wake up its spirit and energy."

Some groups have tribal fetishes that are kept in a house especially constructed for the purpose. One traveler in Guinea found in such a house thousands of rubbishy trifles, such as a pot with red earth and a cock's feather stuck in it, pegs wound with yarn, red parrots' feathers and human hair. There was also a little stool and a mattress for the fetish to rest on, and a bottle of brandy for him to drink.

In all religions that are to any degree organized the priest or medicine man plays a very important part. At first each man attended to his own religious duties, for they were so simple that they could be carried on without assistance. But later as they became more involved, and as the number of spirits increased from a few to a vast multitude, it was necessary to appoint a man whose sole function should be to deal with the other world. It was a sort of specialization within the group. The tribe agreed to support the priest if he would, through his influence, keep the spirits in a good humor and thus ward off evil.

The priests receive their appointment for a variety of reasons. According to Herbert Spencer the chief of the tribe was, after the head of the family, the first one to take part in a religious ceremony. When he was away this office was delegated to some other man, frequently his son. This ultimately resulted in the appointment of one man whose entire functions were religious. At first the choice was made without any special reference to a man's qualifications, but later this was all changed.

To the savage man anything unusual for which he has no explanation is attributed to the spirits. It is by this means that he accounts for any abnormal mental condition, such as insanity or epilepsy. In our modern state we look with pity upon anyone who is so afflicted, but the savage regards such a one with the deepest awe and reverence. When he raves and babbles forth unintelligible sentences, it is supposed to be the voice of the gods and spirits speaking through him. Hence a man in this condition is usually chosen for the priest.

Owing to the type of service rendered by a priest he has almost unlimited power in a savage community. He can threaten to bring down the wrath of the gods upon any who do not follow out his bidding. If he does not think that he is being given enough of this world's goods he can tell the people that unless he receives more he will turn loose all the spirit fiends of the next world. Because of this power it is not strange that the office should be a coveted one. Many of the later day savage priests are as normal as anyone, but they are clever enough to be able to simulate a fit, or swoon, so that the people credit them with allegiance to the spirit world.

Among the negroes the office of priest is often hereditary, although frequently a boy will be accepted for training if he can prove that a spirit has seized him. This he does by a series of convulsive and unnatural bodily distortions. When he begins to study he is told all the "tricks of the trade," so that when older he takes his place as a full-fledged priest who is versed in all the methods of dealing with the spirits. He is also instructed in the various ways of fooling the public and of accounting for any of his predictions that do not come true.

There are so many ways adopted by savage priests of impressing their power on the public that we can mention only a few of them. Let us say that a tribe has assembled to discover whether the outcome of a projected war or hunting expedition will be successful. The priest enters the circle in his full regalia, possibly attended by lesser medicine men. After a few preliminaries he begins to have a fit which is either real or simulated. He falls to the ground, writhing convulsively; he jumps up and leaps upon the bystanders with superhuman strength and a wild beast's ferocity; he pours forth in a voice not his own nor seemingly human a stream of wild, incoherent ravings. He may speak with great eloquence and command, give counsel, and foretell the future. In the end, when the spirit leaves him he collapses on the ground and has to be carried to his hut.

The oracle at Delphi in Greece was a woman, who, when people came to her for a prediction as to the future, would sit on a stool over a crack in the rock from which fumes were rising. These seemed to intoxicate her so that she would go or pretend to go into a trance. While in this condition she would

answer the question in such a manner that it could be interpreted in two ways. Hence, no matter how the event turned out she could say that she had been correct.

In a good many religious ceremonies wine plays a very important part. This was probably due at first to the ecstatic condition induced by this beverage. As the people babbled forth their drunken words, they were supposed to be speaking with the voice of the gods. This religious form became so popular that such gods of wine as Dionysus and Bacchus were worshipped to the accompaniment of large quantities of wine. In ancient Greece the festival of Dionysus was thought so important that most of the great tragedies and comedies of that period were written in his honor.

The priest, or medicine man, is usually the physician of his group. This is not in the least surprising when we remember that all forms of illness are caused by evil spirits who have taken up their abode in the body of the patient. The methods of treatment are usually very simple and are based on the assumption that if things are made very uncomfortable for the spirit it will depart. When a man is taken ill the priest is sent for. He arrives clad in his ceremonial robes and carrying various implements used in practicing his art. The cure begins by the medicine man uttering all sorts of incantations and summoning his own attendant spirits to drive out the invader. He then beats on drums and yells and shouts with the idea that the evil one will be frightened away. If this is not successful he sucks the part afflicted and pretends to draw out some object, such as a stone or a snake, previously kept hidden in his robes. This he shows to the

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AN ANCIENT FUNERAL RITE OBSERVED IN AMERICA

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TREASURES IN AN EGYPTIAN TOMB

assembled people as the cause of the disease. If the patient is fortunate enough to survive the treatment, the medicine man takes all the credit to himself and charges the man a large fee. If, on the other hand, the man dies, he attributes his failure to the influence of some powerful spirit sent by a priest in a neighboring tribe and suggests that the warriors start out on the warpath to vindicate the murder.

If a man who is not a priest is suddenly seized with an epileptic fit or goes violently insane, the only cure is to drive out the spirit that has taken possession of him. Even during the early part of the Christian Era this cause was given for these mental disorders and means similar to those employed by the savage were used in attempting a cure.

Although the early attempts of the medicine man to cure disease were purely hocus-pocus, yet by accident he stumbled upon many real cures. For instance, when he made an incision in the flesh in order to suck out the evil spirit he was leeching and cupping the sick man. "When, again, he compelled the patient to inhale the smoke of tobacco or other medicinal herbs, he was fumigating him, and unwittingly discovering a little bacteriology. These same doctors had found out purgatives and emetics and astringents to drive away with disgust the evil spirits he had in his mind; but the disease departed quite as soon for him as for us, when he gave the proper medicine. Bathing, sun baths, exercise, massage and even faith cure had a part in this practice." It frequently happened that these early doctors would bind on a wound cooling leaves and herbs that had within them healing properties.

We come now to a mental characteristic which the savage has in common with the civilized man.

That is the desire to predict the future and, if possible, avoid evil and bring about pleasure. In the higher stages of society we call this superstition, but with the primitive races it is one of the most important functions of religion. We are inclined to laugh at the savage for many of his peculiarities, but if we were to examine some of the things which we do, we would find that they are open to just as much derision.

As we have said before, the savage is unable to connect cause and effect, but this is also true of those people in the highest civilization who indulge in superstitious fear. The primitive man will attribute bad hunting, sickness, and any other unfortunate occurrence to the action of the spirits. If possible, he desires to know beforehand that these things are scheduled to occur, so that he can devise some means of avoiding them. Of course, the one person in the community who is in close communication with the spirit world is the priest. To him he goes at the first intimation of trouble in order to find a cure, if such there be. The priest listens attentively to his story and then adopts one of many methods for giving him an answer. He will, for instance, kill a chicken and if he finds that its liver shows one color he will tell the man that his future will be bright, but if it is of some other hue, he will warn him against great impending disasters. When the poor man trembles for his safety, the medicine man tells him that he alone can save him. He suggests a sacrifice to the spirits. The savage runs home and brings back large quantities of food and other things which he places at the door of the priest. This functionary takes them in and sacrifices them by consuming them, thus insuring the future safety of his client.

The Greeks and the Romans were very superstitious and molded their entire future actions on the basis of some slight occurrence. They would frequently postpone a battle or a journey because they had seen a flock of birds flying over their camp or house, going in a certain direction. If something took place, the meaning of which they did not know, they would go to an oracle who would interpret the omen for them.

There is very little difference between these people and the so-called civilized man who fears to begin a journey on Friday, to walk under a ladder, or to do a hundred and one other things to which some dire penalty has been attributed.

Among the savage peoples the basis for this belief lies in the thought that the spirits send the omens and it only remains for man to interpret them correctly. With the civilized man superstition is somewhat akin to this. Some experience, a little out of the ordinary, is followed by some totally unrelated misfortune. Hence the way to avoid a recurrence of the disaster is by avoiding the thing which must have caused it; that is, if a person spills salt on the table he can avoid a fight by throwing some over his shoulder. If, on the other hand, he breaks a mirror or opens an umbrella in the house, he feels that he has paved the way for future trouble.

We turn now from superstition to the relationship existing between morality and religion. To a great many people to-day these two terms are interchangeable. They consider that morality is religion and that religion is morality. But this has not always been so, for there was a time when the two were as separate as night and day. We have already seen that to the primitive man religion was merely a

means of easing the struggle for existence and of avoiding any evil or accidents that might happen. A man might steal, kill, or commit any other act which we consider a crime, yet if he sacrificed to the gods and was in every way attentive to them he stood in their favor. In other words, the gods and spirits had no interest in human relationships, and for this reason morality was not a part of religion. Nor did human actions have anything to do with the condition of man in the next world.

The rise of the moral idea in connection with religion was a very slow process. Morals were first introduced as a working basis for group life. It is obvious that no degree of civilization could be reached if every man feared that his neighbor was going to steal from him whenever he had a chance, and that he was going to murder him when his back was turned. A sort of tacit agreement arose in each group, which if put into words would read, "Thou shalt not steal; thou shalt not kill." This applied only to the tribe or clan to which a person belonged. It was considered not only right, but even virtuous, to commit any atrocity on an outside group.

At first any violation of the tribal morality was punished by the injured person or his family, but later the rulers took the administration of justice into their own hands. When these powerful men died the people supposed that their wishes should be carried out, for their influence could still be felt on the earth. It was thought that any violation of the moral code would bring down the wrath of the ancestor-gods upon the offenders. And so little by little morality and religion were joined.

Those people who believe in the transmigration of souls preach the idea that a violator of the tribal

morality will be reborn in other bodies in punishment for their sins done in this world. They say that the wicked shall be reborn blind or deformed.

At first the gods were concerned with only local morality, for the deities were of one people and not universal. These divine rulers would even urge their people to commit all sorts of atrocities on a neighboring tribe in order to exterminate those who did not worship the true gods. As the centuries have advanced the moral group has expanded until in theory, at least, for the Christian nations it includes the whole world.

In closing this chapter on Religion we want to deal very briefly with the subject of Mythology. The savage man is very much like his descendants in his desire to explain every phenomenon of his environment. He wants to know what makes fire burn, wind blow, sun shine, rain fall, thunder roar, and lightning flash. He is not satisfied with merely saying, "I do not know," and letting it go at that. We are able to explain these things on the basis of science, but he has no such knowledge, and so he makes up stories that appear to him logical. From his religion he has peopled every animate and inanimate object in nature with a spirit, and he has made the gods the controlling forces of the elements. Having once personified nature; that is, given life and personality to things, it is a simple matter to make up stories about them and thus account for their actions. The savage says that the sun married the moon and that the result of the union was the stars; the thunder is the voice of an angry god; and an eclipse of the moon is caused by a great monster who swallows that bright orb. Practically all of the primitive peoples have similar stories and some of

them have come down to us as tales of the nursery. One of the best known nature myths is the story of Little Red Riding-hood, in which the child is the sun that is devoured by the wolf, night. The hunter, who is the dawn, cuts open the black beast and lets the sun out.

In the foregoing description of the origin of religion as it is found among the primitive peoples, we have been able to deal with only a few of the more important topics, and these very briefly. We have seen that the first intimation of the spirit world came to our early ancestors through dreams. Not being able to distinguish in their own minds between appearance and reality, they could not distinguish in their language. They could not say, "We dreamed that we saw," they could only say, "We saw." However, in either case the result was the same, and there dawned on the human mind the idea that at death there departed from a man his soul or spirit. This either went into a future world where the life was a continuation of that on this earth, or it stayed around in the vicinity of the tribe to which it belonged. Later these personal souls became dissociated from individuals and joined the great mass of the unnamed members of the spirit world. They took up their abode in all objects in nature and could, therefore, do good or evil to man as they saw fit.

To the savage man religion is almost as much a part of his economic life as is his bow or his spade. Through its agency he thinks that he increases the number of animals in his vicinity and that he causes the crops to grow and bear a hundredfold more than they would otherwise have done. In order to bring about these desirable results he enters into a bargain with the gods. He agrees to sacrifice to them

the things which they need, if they in turn will make his life somewhat easier by giving him the variety of things for which he asks.

As the years advanced, religion became so ponderous that not all men had the time to devote to it. Besides, a good many people felt that if a spell was recited in an incorrect manner (even to the dropping of a single letter), death would come to the user. Under these conditions it was necessary to appoint some man, who was versed in the ways of the spirits, to devote his entire time to their service.

The duties of these priests or medicine men were various. They were expected to predict the future and, if they saw evil there, to tell the people how to avoid it. When animals were needed, or rain for the crops desired, they were called upon to get into communication with the proper spirits in order to bring these things to pass. It was their duty to drive away all unfriendly spirits, and when these had taken possession of a man, thus making him sick, to exorcise them by smoke, fire, water, or evil-smelling concoctions.

These primitive ideas of the material benefits of religion lasted well down through the ages, and there are some that have still held on with surprising tenacity. The tendency, however, is away from the material toward the spiritual. Man is coming to realize more and more that he cannot mold the destiny of the world because things do not suit his fancy. If this idea ever becomes universal, religion will have advanced to a plane far above the rank materialism of the founders of religious thought.

CHAPTER XVII

GOVERNMENT AND LAWS

FAR back in the history of the human race, at a time when man was little better than the animals, there was no such thing as formal law. Each individual was sufficient unto himself, obeying only his own impulses and controlled only by forces over which he had no dominion. He asked no one's permission to carry out his wishes and if his desires clashed with those of another man, the strongest won. As long as he remained in this lonely state there was nothing which could be called even the germ of government.

Things changed when the family, which was founded on some degree of permanency, arose. The man was not entirely free now to wander as the spirit moved for he was obliged to give some thought, however slight, to the woman and children. His word, nevertheless, was law and he forced them to come and go as he chose. This rule was based not on any reason but rather on the whim of the man, but he was strong enough to force the others to obey him. His tenure of office, if the term may be so used, as head of the family was dependent on his ability to drive off any other male who would steal his woman from him. Should he be so unfortunate as to be driven away, his rule ceased.

There is some analogy to be found in the animal world to this state of affairs. The gorilla acts as

the master of his family group, imposing his will on the others, and punishing those who disobey or in any way anger him. He keeps this position until a younger and a stronger male drives him off or kills him. In both the human and the animal groups, strength, without any of the ideas of fitness other than physical, dominates the entire situation.

Among many of the animals which hunt in packs there is usually one leader whose will is imposed upon the others. He directs the chase and runs at the head when an animal is being pursued. His position is held entirely by virtue of his own strength and cunning and he is often forced to fight any other member of the pack who tries to take the leadership from him.

Before progressing any further with the topic of government, it is necessary to pause for a moment to inquire into the reason why men band themselves together into groups. A man who takes upon himself the burden of a family or who unites his family with several others, is certainly limiting his own personal freedom. In the chapter on "Marriage" we saw that he was willing to do this in order to have some one who would do the things that were distasteful to him. While he was limiting himself in one way, yet in another he was gaining, for he was now able to turn over to the woman much routine work.

If a small family group was wandering in the forest it was in constant danger of attacks from wild beasts and from other human groups. On the other hand, if several families united, they were better able to withstand the animal and the human attacks. Under certain conditions this enlarged body could more successfully pursue the struggle

for existence, for while they exhausted a region sooner than would one family, yet their numbers enabled them to catch the larger game with greater ease. Taking it all in all, the gain of union to the individual was greater than the loss of any personal freedom that he might feel.

But to return to the human groups. As civilization advanced and as the means of livelihood became such that the environment could support a greater population, the size of the family increased. The group started with a man and a woman, or several women, with the children. These latter grew up, took wives from a neighboring family and brought them each to their own home.

At this early stage there were few laws, although there were elementary rules of conduct, and each individual did about as he pleased. However, when they were on the march some one had to settle where the camp was to be placed for the night, and in which direction they should go to get the best hunting. This office was tacitly given to the father of the family, although he might be old and unable to defend himself against the younger members if they chose to depose him.

As the years advanced this group became larger until it finally merged into what is called the clan. The blood relationship idea still prevailed and no one could claim membership who was not in some way, however distant, related to the rest of the group. There is, however, an exception to this. If a man was not a member of the clan by right of heritage and if he wanted to join, it was necessary to perform a ceremony which would make him a blood relation. This was done by opening a vein in the arm of the head man and in his arm and then mixing the blood

of the two. Or the relationship could be established by each drinking a little of the blood of the other. As the thought of cannibalism became more horrible in the minds of the people, red wine, which looked like blood, was substituted. Out of this custom grew the toast, which is drunk at a banquet with the idea in mind that all those present are bound together by the red wine of comradeship.

There are other ceremonies performed among different peoples the world over for the purpose of extending to an outsider the protection and privileges granted only to members of the group. In East Africa two people will sit on one hide to become "of one skin." Others will give a stranger a little food or salt, for when two people have eaten together, neither one will injure the other.

The next larger union of the peoples after the clan was called the tribe, which was usually made up of a number of clans. With most savage peoples the union ceased here, but there were a few, such as the Iroquois Indians, who united the tribes into the nation. There were certain of the California Indian tribes where each individual seemed to be his own master and there is at least one group in Asia where they "have no recognized head or chief, although they elect a spokesman, who, to all intents and purposes, is powerless and irresponsible." The Eskimos, who are the mildest and most peaceable of peoples, have no chiefs, but the voice of age is listened to and respected.

Each type of environment in which the various peoples are living brings forth a different form of government. Where a people are constantly on the move they must necessarily have a leader who will direct their steps. If they are a warlike group, they

certainly need some one to lead them in the fight. But if they are a more or less settled people whose environment is favorable, and whose dispositions are not quarrelsome, they will scarcely need more than a counselor. He is usually the oldest man of the tribe, who has been chosen because of his age and his wisdom, although in bodily strength he could easily be overcome by other individuals.

In many tribes where the people are warlike, or rather where they are in constant danger of attacks from neighboring tribes, the strongest man is the leader. This is frequently a self-appointed office, and anyone who desires to argue the matter must do so in terms of brute strength. He is looked up to and followed by the tribe until age or weakness enables some one to overthrow him.

When tribes have advanced to the point where they possess more intelligence, the members demand that they be given a voice in electing their leader, or at least in determining what qualities he shall have. Very often a man who has great physical strength is a coward at heart or has little skill in leadership or in quickness of action. Many peoples force a man who aspires to the chieftainship to undergo various trials in order to prove his fitness. The Australians demand that he show his prowess by throwing and avoiding spears. Certain of the American Indian tribes would only award the rule to a man who could show a large number of scalps taken in battle. Some of the peoples of the South Seas torture a man in the most horrible manner, such as burying him up to his waist in a nest of stinging ants. If he is able to bear the suffering without a murmur he is considered as fit to lead them.

There are certain peoples who choose their rulers on a basis of mental superiority rather than physical. Of course a man who combines both is ideal, especially for a warlike tribe. As a rule, however, this mental qualification is confined largely to peaceful peoples whose ways are settled.

Still another attribute considered necessary by a few groups is wealth. A man who possesses much of this world's goods will gradually collect about him "hangers on" who depend upon him for support and who in turn swear allegiance to him. If he is wealthy enough and the tribe is not very large, he will ultimately hold the rule. This he will keep so long as he can give great feasts and in other ways amuse and support many people.

It frequently happens that the office of chief is a temporary one. If the people are intermittently at war a man will be chosen to lead them for that time, but at the conclusion of peace he takes his place as a regular member of the tribe with no more power than the next man. When a condition like this prevails there may be two chiefs, one for war and the other for peace. During the rule of each, the other sinks to a subordinate position. If a man can be found who has not only the strength and power for war, but also the wisdom for peace, an ideal situation arises that does away with much internal strife between the followers of each of the other two. If, on the other hand, the people are engaged in war most of the time, there is no need to change to a peace chief and so the leadership remains in the hand of one individual until death or age steps in to bring about a change.

It often happens that where there are two chiefs, the one of peace is the priest or medicine man. He

demands obedience on the ground that he controls the spirit world and can harm anyone who is not willing to carry out his instructions. He threatens to send sickness and famine and drought, unless he is supplied with the things which he needs. If there is poor hunting or bad crops he tells the people that it is their own fault and informs them that unless they pay more attention to his bidding they will have even greater misfortunes. In some tribes where there is not only a permanent chief but also a strong medicine man, the people are caught, as it were, between the upper and the nether millstones. One threatens them with bodily harm if they disobey, while the other declares he will summon all the evil spirits to take possession of them if they thwart his wishes.

It is not at all uncommon to find the chief the temporal as well as the spiritual ruler. If the people will not follow him because of his earthly power he may force them by means of his spiritual strength. In ancient Mexico, before a king ascended the throne he had to swear "to make the sun go his course, to make the clouds pour down rain, to make the rivers run, and all fruits to ripen."

We have mentioned here the various ways in which the early chiefs were chosen, but in no one of them is there anything leading to permanency, for they are all dependent on the personal attributes of an individual. If anything happens to him whereby some one else demonstrates greater fitness by superior strength, wisdom, or wealth, the newcomer takes his place with no thought of regular succession. How then does a permanent chieftaincy arise and become established?

When people are on the Hunting Stage they need a strong man to lead them in the chase and in war,

but when they pass to the more settled life of the Pastoral Stage they invariably return to the aged. The father becomes, by virtue of a strong hand, the ruler and owner of his children and wife or wives. This was customary with the Semites and the Aryans, and is found to-day among many of the pastoral African peoples. This family supremacy of the eldest male continued through to the Agricultural Stage and developed into political supremacy. As the father became too old to carry on all the duties of his office, he delegated certain things to his eldest son, so that when he died the boy had been trained into the ways of statecraft and could take up the mantle that had fallen from the shoulders of the elder man. The people had become so accustomed to his partial rule under his father that they were willing to recognize him as their ruler when the time came for a new one.

As the group grew in size we find appearing the conception of the royal family. In some places the eldest son did not, of necessity, rule in his father's place unless he was considered fit, but some other member of the family might be chosen, who fulfilled best the requirements of leadership.

Having briefly dealt with the rise of the rulers in the early societies, we want to take up now the development of the laws by which people have been governed since men began to live in societies. At first, in the family group certain things were taken for granted. For instance, parents would not ordinarily kill their grown children nor would they steal from them. The children on the other hand felt in the same way about their parents.

As the family group became larger these fundamental ideas regarding human relationships still

prevailed. The people realized, either consciously or unconsciously, that no development could go on if every member of a clan or a tribe feared that every other person would, if he had the opportunity, steal from him or kill him. The so-called Ten Commandments are really nothing but tribal laws that had been proved to be for the best good of all, long before they appeared on the mountain top. There was nothing new or startling about them, and if the people had given them a moment's thought they would have realized that as far back as memory could take them they and their ancestors had been living under these same rules that were later put in the form of divine commandments.

At first these laws had no enforcement by constituted authority. The people took them for granted, but if there was any violation of them there was probably no punishment. A father in a fit of anger might kill his child, but as he was the ruler, there was no one to hinder or punish him. Later on when there were many related families living together, if anyone committed a crime, justice was meted out to the criminal, not by the tribe as a whole, but by the injured man and his family. Among the Australians "the holiest duty a native is called on to perform is that of avenging the death of his nearest relation, for it is his peculiar duty to do so; until he has fulfilled this task, he is constantly taunted by the old women; his wives, if he is married, would soon quit him; if he is unmarried not a single young woman would speak to him; his mother would constantly cry, and lament that she should ever have given birth to so degenerate a son; his father would treat him with contempt and reproaches would constantly be sounded in his ear."

Among certain peoples an interesting point is brought up in this connection. The law states that a man is not allowed to kill a member of his own group, and if he does he is open to punishment at the hands of the family of the dead man. But they, by killing him, are likewise committing murder, and this is against the law. To obviate this difficulty the criminal is banished from the tribe, and then as an outsider, can, with impunity, be killed.

The administration of law by the individual leads to almost constant family feuds within the tribe. Those who avenge a murder by killing the criminal lay themselves open to a like retaliation on the part of the family and friends of the dead man. This means that there is constant killing back and forth, for the score can never be settled. It frequently happens that after a man has committed a murder he and his entire family will leave the tribe and travel far in an attempt to escape the punishment that they know is awaiting them. But this does not always avail; for the avenger will follow them almost indefinitely, as he dare not return with the work of honor unfinished. If, after a crime, the criminal escapes alone, his entire family will either flee or try to bring him back, for they will be called upon to pay if he is not soon found.

Such a condition as this leads to great tribal unrest and unless checked will ultimately disintegrate the whole group. The Israelites of the Old Testament realized this, and so they provided "Cities of Refuge" to which the innocent family of a murderer could flee and be safe from attack.

We have spoken here only of murder. There were, of course, numerous other crimes that were not always punished with death. If one man stole

from another the victim would try to get his own property back, and, if he caught the thief, would give him a good beating to remind him for the future that such things were not done within the group. Otherwise, the victim would try to make up his loss from some property owned by the thief.

The peoples on the Congo River in Africa have a very effective way of making a debtor pay what he owes. "The creditor first duns the debtor until he is tired, then he breaks the pots and saucepans, and anything he finds outside the debtor's house, and finishes by telling him that on a certain day he will call again for the money. If the debtor then fails to pay, the creditor will collect a few of his friends, and together they will go and lie in ambush near the farm until a wife of the debtor comes along, when they will pounce upon her and take her to their town. The woman will kick, struggle and scream for the sake of appearances, but she knows that she will be lightly tied and well treated.

"The debtor will hear of the capture of his wife, and, supposing he owes 1,000 brass rods, he will collect the money as quickly as possible, and take it with 500 extra rods, which he will now have to pay to his creditor to compensate him and his friends for the trouble of tying up the woman and the cost of feeding her. As a woman is worth nearly 3,000 rods, it pays the debtor to redeem his property by paying his debt, and the sum demanded for expenses."

As civilization advanced to a higher stage and tribal law and government became more developed, the guilt or innocence of a man accused of a crime was first judged by the chief or by a body of older

men. Under the old system it frequently happened that a person suspected of a crime, whether innocent or guilty, was punished. Under the new system a man had a chance to plead his case, and, if innocent, to prove the fact. If, on the other hand, he was guilty, the injured man or his family were allowed to carry out the punishment that they saw fit.

With the further development of tribal organization it was realized that in a large number of cases the punishment meted out to a guilty man was out of all proportion to the crime. If the injured man was of a violent temperament he might kill his victim for a very slight offense. Hence the rulers, along with their judgment as to the guilt or innocence of a person, took upon themselves to state what the punishment should be. In most instances they made the man suffer to the same extent that he had made his victim suffer. If he committed murder, he was killed; if he had stolen, he had to return the same amount; if he injured a man in any way, he was injured in the same way. In the old Hebrew law this was called "An eye for an eye, and a tooth for a tooth"; to-day we would call it the Law of Retaliation from the Roman *lex talionis*.

In very primitive societies there is nothing which corresponds to money, but as people develop they need some medium for carrying on their trade. This is usually the most characteristic commodity in the country, such as salt, beads, cattle, gold. With the introduction of a medium of exchange the wealth of a person is determined by the amount of money which he possesses. So firmly is the desire to obtain wealth implanted in the minds of people, that they will forego the thought of personal ven-

geance if it will bring them in any money. This gives rise to the payments of fines for crimes. A regular scale is drawn up wherein every offense has its money punishment. If we will turn to the early English law we will find this illustrated in detail. If a freeman stole from a king, he had to pay nine times the value of the goods taken, but if he stole from another freeman he paid only threefold. If a man's slave killed an earl the owner paid 300 shillings and gave the slayer up to justice. If the slave killed a freeman the owner paid 100 shillings. The following table shows some of the payments for various bodily injuries:

Loss of ear	12	shillings
Pierced ear	3	"
Mutilated ear	6	"
Loss of eye	50	"
Loss of beard	20	"
Loss of each of the four front teeth	6	"
Loss of thumb	20	"
Loss of thumb nail	3	"
Loss of little finger	11	"
Broken rib	3	"
Loss of foot	50	"
Loss of big toe	10	"

England went through a period when there were so many crimes committed, that the death penalty was imposed for what seem to us to be very minor offenses. It was the hope of those who made these laws that the severe punishment would act as a deterrent to any who might feel inclined to commit a crime. As conditions became more settled the offenses for which the death penalty was given were reduced, until now they can be counted on the fingers of one hand.

After the punishment of crime had been taken out of the hands of the injured party and put under the control of the ruler or his representatives, it was a very common procedure to ask the aid of the spirits and of God to determine whether the accused were guilty or not. This was based on the idea that if the case were stated to the supernatural powers, they would show by some sign whether the supposed criminal was really the one who had committed the crime. In most cases, however, the so-called ordeal was of such a nature that there was little or no hope that any other verdict than "guilty" could be given. For instance, an accused man was required to walk barefoot on hot plowshares. If he was not burned he was innocent, but if he was, he was guilty. Another one was a sort of "heads I win, tails you lose." A man was thrown into the water, and if he was drowned he was innocent and God received his soul; but if he floated the Deity rejected him and so he was taken out and punished, frequently by death. Even during the Colonial period in this country the ordeal was a popular means of determining whether a person were really a witch or not. Suspected individuals were given a piece of red-hot iron to hold or asked to do some other equally painful thing, and if they failed they were adjudged guilty.

There were some ordeals that were less strenuous, as, where a person would put a piece of bread in his mouth and then say, "May I choke on this if I am telling a lie," or, "May God strike me dead if I am not telling the truth."

An interesting survival of this remains to us now in the oath. A man puts his hand on the Bible and swears "to tell the truth, the whole truth, and

nothing but the truth." He implies that he expects something terrible to happen to him if he lies.

There is one thing of importance to be noted in connection with all these early laws and that is that they apply to the group only and not to outsiders. In the mind of the savage man there is no horror of murder and stealing except in so far as his own tribe is concerned. Among many of the American Indians a youth is not considered a real member of the tribe until he has killed a man, and no woman will marry him until he wears the feather to which a scalp gives him the right. The tribes of Borneo judge bravery by the number of heads which a man has taken, and no girl will marry a man until he has at least one to his credit. Should he get the bloody trophy from among his own people, he would be punished at once.

As we saw, when we were dealing with morality, any act, no matter how atrocious, committed against another tribe, was a matter of commendation. Even the God of the Old Testament advocates the most horrible crimes toward those who were not His "chosen people."

There is one force in society which does more to compel people to obey the laws and customs than any fear of punishment could possibly do. We refer to public opinion. Even in the savage tribes the fear of what the women will say or the derision of their laughter will often drive a man to do something that is much against his will. Rules of conduct which are not of enough importance to be formulated under the heading of laws, are necessary in every group, no matter how small. How or why these things arose, we cannot go into here. Suffice it to say, they do exist, and the power that

enforces them is public opinion. But among the savage peoples religious fear is an important factor in compelling individuals to obey the will of the many. The rules and customs and laws were formulated by the ancestors when they were on this earth. While living they forced the people to obey them, hence, after they died, the power which they wielded still remained. If the people feared to thwart their wishes when they were here in the flesh, how much more should they fear to transgress after the ancestral lawmakers had passed into the great beyond? Hence it came about that rules of conduct fell under the control not only of the temporal power, but also of the spiritual.

In our present-day society a person is governed more by the fear of what "they" will say than he is by any other one thing. Many people are even deterred from committing a crime or breaking over some of the moral laws, not because they fear the courts, but rather because they could not face the social ostracism which would follow such an act. Most of us are poured into the same social mold and then turned out, a pattern of propriety. We all wear the same general style of clothes and do the same kind of things as the rest of our group. If a person appears who is not willing to conform, he is called "queer" and people rather shun him, for he is "not as we are." Public opinion can make anything right or anything wrong, whether it be for the best or the worst interest of society.

It is important here to say a few words about the rise of the social classes. In the most primitive societies all the members are equal; even when a ruler is recognized, he remains as an individual who is in no way connected with a class. On the Hunt-

ing Stage everyone has about the same amount of property, and the work is of such a nature that practically the only division of labor is between the sexes. This state of affairs lasts until a condition arises to force one group into a position of superiority over another. In all probability, wealth or brains or power did not do this at first, but rather the introduction of a group of captives taken in war who were held in a condition of slavery. The people of the tribe came to feel that they had been doing a great many things in the struggle for existence that were distasteful to them. With the arrival of a number of men and women who had no choice but to do what they were told, many of the unpleasant burdens could be shifted to their shoulders. This gave rise to two types of labor, slave and free, and thus to two social classes, slaves and freemen. Before the arrival of these new laborers there were probably some men in every tribe who were regarded with disgust because they were too lazy to work and depended upon the goodness of their fellow tribesmen for sustenance. Even these, with the introduction of slaves, rose to a higher place in the social world, for while the members of their group did not regard them with any more affection, yet there was now a class below them that aroused even more disgust.

From this point on there was no one thing that gave rise to other social classes. Various environments and conditions of life laid emphasis on a variety of different things. In warlike societies the warriors and their families ultimately occupied a position somewhat above their more peaceable companions. When a permanent succession of rulers arose, a class that was differentiated from the common people came into being. If the chief or king

wished to honor some of his followers who were not of the royal blood, he would give them a title that raised them above their fellows. With this there frequently went great gifts of land and other things which enabled these more fortunate nobles to establish an aristocracy not only of title but also of wealth. This brings us to another reason for class distinction; namely, a big supply of this world's goods. We find this more prevalent in great industrial countries, where a large portion of the population is engaged in manufacturing and trade. Up to a few years ago, the aristocracy of Europe was based almost entirely on hereditary titles, but gradually this is changing. Trade and industry, which were looked upon with disgust, are coming to be regarded in a different light, as more of the influential people engage in them. The time is coming when the old order will have changed so that the social classes will be based on the ability to succeed in industry, rather than on the bravery of some ancestor who lived several hundred years ago.

We cannot enter here into a discussion of the modern socialistic doctrine which states that ultimately all class barriers will be broken down. This may be sound in theory, but in practice it will never succeed, for there will always be men with more ability than the rest who will rise above their fellows, and who, either through the power of their wealth or their personalities, will become the moving force in society. At the other end of the scale there will be the loafers and the incapacitated who will be perfectly willing to let others lead so long as they themselves have enough to eat, a place to sleep in, and no labor of any kind to do. Those faddists who think that they can change human nature

by their theories will find that in the ultimate analysis, unless they return to the savage state where no one possesses more than the barest necessities of life, men will always resolve themselves into social classes based either on wealth or power.

We have maintained the fact that the first social class distinction was brought by the introduction of slaves. This was an event that was very far-reaching in its influence, so before closing the chapter, we want to deal briefly with their part in the development of civilization. Before they appeared on the scene, the work of all kinds was carried on by the people of the tribe. They labored at the uninteresting but necessary things as well as at the things which they enjoyed. Their entire time was devoted to the struggle for existence with the result that their minds and energies could not be used toward the advancement of anything but the material culture. When the slaves were brought in, they were set at once to the tasks which the freemen did not enjoy. The result was that the tribal members had leisure time which they could use in furthering their civilization. This meant an onward step, not only in the material things of life, but also in the arts, sciences, and religions.

During the height of the civilization in Egypt and Greece we find the slaves occupying a very unique place in the lives of the people. They were brought to these two countries by traders who had captured them in raids on unprotected towns. Most of them belonged to the white race, hence they were men of intelligence. The method employed by the slave traders was to take those men captured in Egypt and sell them in Greece and vice versa. These slaves were often skilled artisans in their own countries

and they were frequently the sons of the chiefs or nobles. This skill they carried with them to their new home and taught their masters much of the culture of another land.

We have now, briefly, completed the subject of Government, Laws, and Social Classes. At the beginning of human history men were wandering around alone or in family groups so that the only ruler was the father. As the years advanced and the groups became larger some strong man appointed himself as chief, an office which he retained as long as he had the strength to drive off anyone who wished to dispose him. Each succeeding stage of development and each environment saw a new ruler of a different type, either self-appointed or chosen by his fellow tribesmen. A man was selected because of his bravery, his skill, his knowledge, his wealth, or his religious power. Out of all this chaos arose the settled, hereditary leaders of the tribes and the nations.

The first injunctions were the will of the individual imposed by him upon those with whom he came in contact. They were frequently of no benefit to anyone but the maker, for his welfare was seldom coincident with that of anyone else. However, as more people began to band themselves together for protection the will of the individual was sunk in the good of the many. The first laws were merely some of the fundamental rules of conduct that made the life of a group of people possible. They were not formulated into a code, but were a tacit understanding that life, limb, and property should be safe from attack within the tribe.

At first the individuals kept the punishment for the violation of these laws in their own hands, but

later, when tribal government became more powerful, the rulers not only judged a man guilty or innocent, but also administered the penalty. It was not always this fear of punishment which kept the people from violating the laws. Public opinion was a deterrent force more powerful than any fear of physical pain. Not even a savage man can stand the laughter and the scorn of his own people and he will do almost anything to escape these. Added to this is the fear of displeasing the ancestors, should any of the laws be disobeyed which they formulated while on the earth. Taken together, public opinion and religious fear are forces so strong that even the bravest savage trembles at the thought of any violation that will direct them toward him.

The radicals who advocate the abolition of government and class rule and the substitution of mob rule little realize that such a move would break down all the civilization that has been built up since the beginning. Were this condition ever to come, we could turn with longing eyes to the savage peoples whose lives are regulated by law and order. We may be far from perfect and there are many changes that could well be brought about, but whatever is done, we must not give up the basic idea of a government conducted on the principle of the greatest good for the greatest number.

CHAPTER XVIII

SUMMARY

WE have come to the end of our brief discussion of the science of anthropology. It has been possible to deal with only a few of the more important topics that have gone to make up the history of human civilization. In our selection we have striven to touch upon enough different subjects so that the reader will have an outline, at least, of the whole picture. Any one of the chapters could readily be expanded into a volume by itself, and it is the hope of the author that enough interest has been aroused to cause the reader to delve deeper, in order to fill the detail in for himself. If we could have painted the entire canvas we should have had a picture so vast and so wonderful that those who have doubted the unity of all mankind would have been convinced.

It is only by accepting the theory of evolution that we can make out of anthropology a science whose laws are universal as regards time and place. As applied to the physical world of the plants and animals this law states that all life originated with the single cell and from this simple beginning it multiplied, increased, and become more complicated. The single cell divided into two and those into four and so on up until man, the most complex of all cell structures, was reached. There were various factors, enforced by nature, which governed this

development. We call these Variation, Mutation, Heredity, Struggle for Existence, Survival of the Fittest. The fact that all life, whether in the tropics or the frozen north, on the mountains or by the sea, is subject to law, classifies evolution as a science.

The social life of man also is governed by these same laws acting in a different way through different agencies. The results, however, are similar. We see the simplest and most primitive act of man grow and develop until out of it there comes some great art or science. His act is the one-cell stage in the social evolution of that particular thing. When he picks up a stone and throws it at an animal, he shows the prototype for the great guns that can hit objects fifty miles away. Everything that he does to make his way of life easier is the germ of some great development. Hence in order to study our modern civilization with any degree of intelligence we must go back to the beginning among the most primitive of the cave men in order to pick up the first thread of the story of social life.

As man slowly emerged from the great mass of developing life and stepped out on the plateau far above his nearest relatives, there dawned for him a new era. Many of the laws which held him with a firm grip began to relax their hold, for that great organ of power, the brain, had made him, to some extent, master of his fate. Around himself he has thrown a vast artificial environment which we call civilization. This has enabled him to ward off the actions of many of the natural laws. He has invented weapons to bring down his animal food, clothes to cover him, houses to protect him, and vehicles to carry him rapidly over the ground. If he were an animal without the power of reasoning he would have had to

grow long claws, hairy covering and swift legs to bring about the same results.

It is upon the ability to reason that most of man's superiority is based. He was able to look into the future and, with the aid of the power of imagination, to picture some of his needs. Until this ability was firmly established no civilization could have developed, for in order to reach this stage it is necessary to store up experiences, and to collect property for future use. We can say, then, that foresight and advancing civilization have, from the beginning, gone hand in hand.

There are two things which determine the type of culture in any part of the world. The first is environment and the second is the brain power of the people living in that place. Those in the heart of the tropics where the very climate kills ambition, have never reached any great height of culture. On the other hand, where a group is in the temperate zone they will, in all probability, advance much further than their brothers in the more southerly region. The fact that they have been able to live at all in the colder climate shows that they must have greater mental power for adaptation.

In the history of civilization there have been four great socializing forces that have driven men on to action. They are hunger, love, vanity, and fear. These are all fundamental human sensations and have given rise to the arts of making a living, to the institution of marriage, to the development of pleasure and the æsthetic arts, and last, to the religions of the world.

To the growth and development of each one of these institutions we can apply the laws of evolution. They each started, as it were, from a single cell,

from some small act or thought on the part of man. From this simple beginning they grew—struggling for life with new things that were discovered, surviving if they were fit, if not, giving place to the more suited. They were passed on from generation to generation by word of mouth and by imitation. Changes were constantly being made in them, some expedient others inexpedient. Through the long ages this process has gone on, until from out the chaos there have appeared the institutions as we know them to-day. But the growth and increase are not finished and never will be, for "the old order changeth, yielding place to new." We are as much in the midst of evolution now as at any time in the history of civilization and this process will cease only when man has disappeared from the earth.

As our civilization advances our life becomes more complex. What the future has in store for us we do not know, but it is certain that the institutions will be an outgrowth of those already existing. In order to study either the present or the future it is necessary that a knowledge of the past be thoroughly mastered. This, then, has been the purpose of this book, to set forth the beginnings and early development of the arts, sciences, religions, governments, and to show that in their growth they are subject to the same laws of evolution which control the living things of the world.